



MOTOROLA INC.

**SYSTEMS SABER™
SECURENET™**

Handie-Talkie Portable Radios

403 - 512 MHz

Service Manual



Manual Scan

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Thank you,

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MOTOROLA

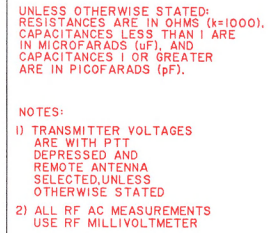
MANUAL REVISION
for Service Manual
68P81066C95-0
SYSTEM SABER SECURENET
403-512 MHZ

This revision outlines changes that have occurred since the printing of your manual. Use this information to supplement your manual. Installation of these changes in earlier equipment is not necessary except as recommended in Motorola Service and Repair Notes (SRN's).

REVISION CHANGES

1. Remove and discard Main Board Schematic Diagram and Parts List pages 15, and 16 of your manual, and replace with new Main Board Schematic Diagram and Parts List attached.





SYSTEMS SABER UHF SECURENET
Electrical Parts List

TPLF-3925-A

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
C1	-----	CAPACITOR, Fixed: $\mu\text{F}\pm 20\%$; 25V unless stated
C2	2113741A25	1500pF $\pm 5\%$
C3	2160521H41	.22+80-20%
C4	2160521G37	0.1+80-20%
C5	2113741A17	680pF
C6	2362998B68	4.7; 10V
C7	2160521H41	.22+80-20%
C8	2160521G37	0.1+80-20%
C9	2362998B73	10; 16V
C10	2160521H39	.15 $\pm 10\%$; 35V
C11	2362998B64	2.2; 20V
C12	2113741A17	680pF $\pm 5\%$
C13	2113741A45	.01
C14	2160521G37	0.1+80-20%
C15	Not Used	Not Used
C16	2113740A46	47pF $\pm 5\%$
C17	2160521G37	0.1+80-20%
C18	2160521H41	.22+80-20%
C19	2362998B16	3.3 $\pm 10\%$; 16V
C20	2362998B59	1; 16V
C21	2362998B68	4.7; 10V
C22	2160521G37	0.1+80-20%
C23	2113741A33	3300pF $\pm 5\%$
C24	2362998B69	4.7; 20V
C25	-----	Not Used
C26	2113741A37	4700pF $\pm 5\%$
C27	2113741A59	.039 $\pm 5\%$
C28 thru 30	2362998B59	1; 16V
C31	-----	Not Used
C32	2113741A59	.039 $\pm 5\%$
C33	2160521H43	.33+80-20%
C34	-----	Not Used
C35	2160521H43	.33+80-20%
C36,37	2160521G37	0.1+80-20%
C38	2113740A55	100pF $\pm 5\%$
C39,40	-----	Not Used
C41	2113740A55	100pF $\pm 5\%$
C42,43	-----	Not Used
C44	2160521G37	0.1+80-20%
C45	-----	Not Used
C46	2113740A55	100pF $\pm 5\%$; 50V
C47	2113741A45	.01
C48	2113741A53	.022 $\pm 5\%$
C49 thru 60	-----	Not Used
C61	2113741A53	.022 $\pm 5\%$
C62	2362998B68	4.7; 10V
C63	2160521G37	0.1+80-20%
C64 thru 66	2113740A55	100pF $\pm 5\%$; NPO
C67 thru 69	-----	Not Used
C70	2113741A51	.018
C71	2113740A54	91pF $\pm 25\%$; NPO
C72 thru 74	-----	Not Used
C75	2113740A55	100pF $\pm 5\%$
C76	-----	Not Used
C77	2113741A45	.01
C200	2113740A55	100pF $\pm 5\%$
C201	-----	Not Used
C202	2113741A51	.018
C203,204	-----	Not Used
C205	2362998B05	.47 $\pm 10\%$
C206 thru 211	-----	Not Used
C212,213	2113741A51	.018
C214	-----	Not Used
C215	2362998B16	3.3 $\pm 10\%$; 16V
C216	2362998B73	10; 16V
C217	2113740A55	100pF $\pm 5\%$
C218	2160521C21	4700pF $\pm 10\%$
C219,220	-----	Not Used
C221	2362998B68	4.7; 10V
C222	2160521A19	3300pF $\pm 5\%$
C223	2113740A55	100pF $\pm 5\%$
C224	2113741A33	3300pF $\pm 5\%$
C225	2113740A55	100pF $\pm 5\%$
C226	2362998B73	10; 16V
C227	2113741A51	.018
C228	2113740A55	100pF $\pm 5\%$
C229	-----	Not Used
C230 thru 232	2113740A55	100pF $\pm 5\%$

C233	2362998B16	3.3 $\pm 10\%$; 16V
C234	2113740A55	100pF $\pm 5\%$
C235, 236	-----	Not Used
C237	2160521H41	.22+80-20%
C251 thru 253	2113740A55	100pF $\pm 5\%$
C400,401	2113740A38	24pF $\pm 5\%$; 50V; NPO
C402	2362998B73	10; 16V
C403	2362998B68	4.7; 10V
C404	-----	Not Used
C405	2113741A45	.01
C406	-----	Not Used
C407,408	2160521G37	0.1+80-20%
C409	2113740A13	2.7pF
C410	-----	Not Used
C411,412	2160521G37	0.1+80-20%
C413 thru 415	2113740F51	100pF
C500	-----	Not Used
C501 thru 514	2113740A55	100pF $\pm 5\%$
C515	-----	Not Used
C516 thru 520	2113740A55	100pF $\pm 5\%$
C521	2113741F25	1000pF
C700,701	2160521G37	0.1+80-20%
C702	2362998B16	3.3 $\pm 10\%$; 16V
C703	2362998B05	.47 $\pm 10\%$
C704	2362998B68	4.7; 10V
C705	2160521G37	0.1+80-20%
C706 thru 709	-----	Not Used
C710	2113740A55	100pF $\pm 5\%$
C800	-----	Not Used
C801	2113740A55	100pF $\pm 5\%$
CR200	-----	Not Used
CR201	4805129M05	SOT
CR400	4805729G34	LED, Red
CR401	4805729G35	LED, Yellow
F900	0105955P27	FUSE: ASSEMBLY, 5 Amp
FL1	-----	FILTER: Not Used
FL2	9105685Q05	Ceramic; 450kHz; 20kHz BW
FL3	9105685Q06	Ceramic; 450kHz; 15kHz BW
J1	0905287C05	JACK: Socket, Printed Circuit (LCD Interconnect)(10 req'd)
J2	0905287C05	Socket, Printed Circuit (PTT Controls Flex)(11 req'd)
J3	0905287C05	Socket, Printed Circuit (Speaker/Mic Connector)(4 req'd)
JU500 thru 503	-----	JUMPER: Not Used
JU504,505	0605021K01	0 Ω
L1	2405452C64	COIL, RF: unless stated 150nH $\pm 5\%$
L2	2462575A05	Choke; 4.7uH
L3	2405452C49	360nH $\pm 5\%$
L4	2405452C09	50nH $\pm 5\%$
L200 thru 206	-----	Not Used
L207 thru 210	2405452C49	360nH $\pm 5\%$
L400	2460578C43	33uH
P1	-----	PLUG: Not Used
P2	2805520Q01	Connector
P3,4	-----	Not Used
P5	3905446Q03	Contact, Antenna
P6	3905445Q03	Contact, RF Wireform
Q1	4805128M16	TRANSISTOR: See Note 1 PNP; SOT-23
Q2	-----	Not Used
Q200,201	4805128M44	NPN; SOT-23
Q202	4805128M27	PNP; SOT-89
Q203	4805128M16	PNP; SOT-23
Q204	4805218N13	PNP; SOT-23
Q205	-----	Not Used
Q206	4805128M16	PNP; SOT-23
Q207,208	4805128M29	PNP; SOT-23
Q400	-----	Not Used
Q401	4805128M27	PNP; SOT-89
Q402 thru 405	4805128M44	NPN; SOT-23

R1	0660079V23	RESISTOR, Fixed: $\Omega\pm 5\%$; 1/8W unless stated
R2	-----	Not Used
R3	0660076E76	13k $\pm 1\%$
R4	0660078T24	91k
R5	0660078T01	10k
R6	-----	Not Used
R7	0660078J80	49.9k $\pm 1\%$
R8	-----	Not Used
R9	0660078G33	2k $\pm 1\%$
R10	-----	Not Used
R11	0660078G33	2k $\pm 1\%$
R12	0660076A49	1k
R13 thru 15	-----	Not Used
R16	0660079V28	130k
R17	0660076E73	10k $\pm 1\%$
R18	0660076E89	47k $\pm 1\%$
R19	0660076A49	1k
R20,21	-----	Not Used
R22	0660076A92	62k
R23 thru 59	-----	Not Used
R60	0660076A29	150
R61	0660076A77	15k
R62	0660076B01	100
R63, 64	-----	Not Used
R65	0660076A25	100k
R200 thru 208	-----	Not Used
R209	0660076A49	1k
R210	0660078J80	49.9k $\pm 1\%$
R211	0660076A75	12k
R212	0660078G33	2k $\pm 1\%$
R213	0660076A75	12k
R214	0660076B01	100k
R215	-----	Not Used
R216,217	0660076A73	10k
R218	0660076E73	10k $\pm 1\%$
R219	0660076E85	20k $\pm 1\%$
R220	0660076B01	100k
R221	0660076E89	47k $\pm 1\%$
R222	0660076A73	10k
R223,224	-----	Not Used
R225	0660076A73	10k
R400	-----	Not Used
R401	0660076A65	4.7k
R402	0660076B25	1M $\pm 5\%$
R403	0660076B01	100k
R404	-----	Not Used
R405	0660076A73	10k
R406	0660076A73	10k
R407	0660076A65	4.7k
R408	0660076B01	100k
R409	0660076A29	150
R410	0660076A41	470
R411	0660079J33	20k $\pm 1\%$
R412,413	0660078L01	100k $\pm 1\%$
R414	0660078T01	10k
R415	0660076B01	100k
R416	0660078L01	100k $\pm 1\%$
R417	0660076B01	100k
R418 thru 424	-----	Not Used
R425	0660076A73	10k
R426 thru 429	-----	Not Used
R430	0660076A29	150
R431,432	-----	Not Used
R433	0660076A21	68
R434	-----	Not Used
R435	0660076A49	1k
R436	0660076A41	470
R437	0660076N49	1k
R500	0660076A73	10k
R501 thru 506	-----	Not Used
R507	0660076B01	100k
R700	0660078J80	49.9k $\pm 1\%$
R701	0660076A49	1k
R702	-----	Not Used
R703	0660076E89	47k $\pm 1\%$
R800	RPX4690A	Potentiometer, Kit, On/Off/Volume (includes S800)
R801	0660076B08	200k
R802	0660076A93	68k
R803	-----	Not Used
R804	0660076A85	33k
R805	0660076A49	1k

S800	RPX4690A	SWITCH: Kit, On/Off/Volume (includes R800) Dual-Function, Clear/Code (S804)(Standard) and Emergency (S801)(Optional)
S801/S804	4005221R01	Not Used
S802	-----	Not Used
S803	RPX4694A	Kit, Contact Snapdome, PTT
S805	RPX4694A	Kit, Contact Snapdome, Monitor
S806 thru 822	-----	Not Used
S823	RPX4689A	Kit, Frequency
U1	-----	CIRCUIT MODULE: See Note 1
U2	NLE9432A	Not Used
U100	0105958P77	Filter/Amp/Mixer
U101	0105958P80	IC, I-F
U102	0105958P74	IC, Audio Filter, CMOS
U103	5105469E65	IC, Audio, Bipolar
U200	0105953N05	IC, Regulator
U201	0105959P66	IC, Digital/Analog Converter, CMOS
U202	0105959P66	Transmit Automatic Level Control
U203	NLE9472A	5W-Power Amplifier
U300	NFE6061A	Filter/Detector/Switch
U301	NXN6269A	Synthesizer (440-470 MHz)
U400	0105956S06	Oscillator, Reference; 16.8MHz
U700	0105954S43	Microcomputer, MC68HC11; Binary
U900	NTN4720A	Signal Filter, Phase II, CMOS
or	-----	SECURENET Bypass Module Optional Encryption Module
VR800	4805129M35	DIODE: See Note 1
VR801	4805129M49	Zener, 5.6V
VR802	-----	Zener, 16V
VR803 thru 807	4805129M35	Not Used
VR808	4805129M49	Zener, 5.6V
VR809 thru 812	4805129M35	Zener, 16V
VR813	-----	Zener, 5.6V
VR814	4805129M49	Not Used
VR815	-----	Zener, 16V
VR816	4805129M35	Not Used
Y400	4805664G32	Zener, 5.6V
NONREFERENCED ITEMS		
	0905287C07	SOCKET, Printed Circuit (for all modules)(71 req'd) BOOT, Crystal (For Y400) PAD, Oscillator (For U301) PC BOARD, Main
	1405881R01	
	7505934Q01	
	8405334T01	

NOTE:
1. For optimum performance, order replacement diodes, transistors, and circuit modules by Motorola part number only.

SYSTEMS SABER Controller Board
Electrical Parts List

TPLF-3926-O

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
C500,501	-----	CAPACITOR, Fixed: pF $\pm 30\%$; 50V unless stated
C502 thru 505	2113740F51	Not Used
C506	2113740A55	100
C507 thru 510	2113740F51	100
C511	2311049A37	1uF $\pm 20\%$
C512	2113741B69	.1uF
C513,514	2113740A38	24
C515	2113740A13	2.7 $\pm 25\text{pF}$
C516	2113741A45	.01uF
C517 thru 519	2113741B69	.1uF
CR501,502	4805729G37	DIODE: See Note 1
CR503	4805129M06	LED; Green SMD (See Note 2) Dual; SOT-23 (See Note 2)
J7	0905287C10	JACK:
J8	0905287C10	Socket, Keypad; (qty 9) Socket, LCD; (qty 10)
L501,502	2462575A23	COIL, RF: Unless stated
L503	2460578C43	.1uH
Q501	4805128M12	33uH
Q502	4805218N50	TRANSISTOR: See Note 1
Q503	4805128M12	NPN; BCW60B (RH) (See Note 2) NPN; SOT-23 NPN; BCW60B (RH) (See Note 2)
R501	0660076A09	RESISTOR, Fixed: $\Omega\pm 5\%$; 1/8W unless stated
R502	0660076A69	22 (See Note 2)
R503	0660079V13	6.8k (See Note 2)
R504,505	-----	33k
R506	0660079V13	Not Used
R507,508	0660076N49	33k
R509	0660079V13	1K
R510	0660076N39	33k
R511	0660076N49	390
R512	0660076A39	1k
R513	0660076N85	390
R514	0660076N39	33k
R515	0660079U89	390
R516	0660076B12	4.7k
R517	0660079U89	300k
R518	0660076A73	4.7k
R519	0660079V13	10k
R520	0660079V25	33k
R521,522	0660079V13	100k (See Note 2)
R523	0660076A73	33k (See Note 2)
R524	0660079U73	10k (See Note 2)
R525	0660076F08	1k (See Note 2)
R526 thru 533	0660079V13	200k $\pm 1\%$ (See Note 2)
R534	0660076A73	33k
R535	0660076N85	10k
R536	0660076A73	33k
R537	0660079U89	10k
R538 thru 547	0660076N73	4.7



MOTOROLA INC.

MANUAL REVISION

for

Service Manual No. 68P81066C95-O SYSTEMS SABER™ and SABER ATS™ UHF Handie-Talkie® Portable Radios

This revision outlines changes that have occurred since the printing of your manual. Use this information to supplement your manual. Installation of these changes in earlier equipment is not necessary except as recommended in Motorola Service and Repair Notes (SRN's).

REVISION DETAILS

<u>NO.</u>	<u>CHANGE AFFECTS</u>
1	SPECIFICATIONS
2	MODEL CONFIGURATION
3	FOR USE IN HAZARDOUS ATMOSPHERES
4	SYSTEMS SABER UHF SECURENET Electrical Parts List TPLF-3925-O
5	SYSTEMS SABER Controller Board Electrical Parts List TPLF-3926-O
6	SYSTEMS SABER I SECURENET UHF Exploded View Parts List TPLF-3923-O
7	SYSTEMS SABER III SECURENET UHF Exploded View Parts List TPLF-3924-O
8	Table 2. Modulation/Squelch Modes

CHANGES

NO.

- 1 On page 1, add the following information to the **SPECIFICATIONS** table:

TRANSMITTER		RECEIVER	
CURRENT DRAIN (with 7.5V Supply)		CURRENT DRAIN (with 7.5V Supply)	
Low Power (1-2 Watts)	1900 mA	Receive (500mW Audio)	225 mA
High Power (2-5 Watts)	3300 mA	Standby	95 mA
CHANNEL			
SPACING:	DEVIATION	PL DEVIATION	
25 kHz	±5 kHz	±1.0 kHz	
12.5 kHz	±2.5 kHz	±0.5 kHz	



On page 1, change existing information in the **SPECIFICATIONS** table to read as follows:

TRANSMITTER		RECEIVER	
RF POWER OUTPUT		SENSITIVITY	
Low-Power Models	1-2W		<u>12.5 kHz</u> <u>25 kHz</u>
High-Power Models	2-5W	20dBs:	0.5µV 0.4µV
		12dBs:	0.5µV 0.3µV
		Squelch	(Programmable): 0.5µV Max.
FREQUENCY STABILITY (-25°C to +55°C; +25°C REF.):		SELECTIVITY	
25 kHz	±.0002%	Adjacent Channel:	25 kHz -70dB
12.5 kHz	±.0002%		12.5 kHz -60dB
MODULATION (±5kHz for 100% modulation @1000Hz) (±2.5kHz for 100% modulation @1000Hz [12.5kHz only])		FREQUENCY STABILITY (-25°C to +55°C; +25°C REF.):	
	Types 20K0F3E	25 kHz	±.0003%
	20K0F1D	12.5 kHz	±.0002%
	20K0F2D		
SPURIOUS EMISSION (CONDUCTED AND RADIATED)		CHANNEL SPACING:	
1.0W	-67dBc		25, 12.5kHz
2.0W:	-70dB		
5.0W:	-74dBc		

On page 1, change the existing information below the **SPECIFICATIONS** table to read as follows:

All specifications are per EIA RS316B, unless noted.
All radio parameters for 12.5kHz channel spacing models are measured per CEPT 84 methods.
Specifications are subject to change without notice.

2 On page 2, change the **MODEL CONFIGURATION** table to read as follows:

FACTORY ID	RADIO TYPE	POWER LEVEL	FREQUENCY	SUBMERSIBLE	KEYPAD	DISPLAY	12.5kHz
H34TUN5170CN	SYS. SABER I	1-2W	403-512MHz	No	No	No	No
H44TUN5170CN	SYS. SABER I	2-5W	403-512MHz	No	No	No	No
H44TUN5570CN	SYS. SABER I	2-5W	403-512MHz	No	No	No	Yes
H34YUN5170CN	SYS. SABER I	1-2W	403-512MHz	Yes	No	No	No
H44YUN5170CN	SYS. SABER I	2-5W	403-512MHz	Yes	No	No	No
H44YUN5570CN	SYS. SABER I	2-5W	403-512MHz	Yes	No	No	Yes
H34TUK5170CN	SYS. SABER III	1-2W	403-512MHz	No	3x5	Yes	No
H44TUK5170CN	SYS. SABER III	2-5W	403-512MHz	No	3x5	Yes	No
H44TUK5570CN	SYS. SABER III	2-5W	403-512MHz	No	3x5	Yes	Yes
H44TUB5170CN	SABER ATS	2-5W	403-512MHz	No	No	No	No
H44YUB5170CN	SABER ATS	2-5W	403-512MHz	Yes	No	No	No
H44TUB5570CN	SABER ATS	2-5W	403-512MHz	No	No	No	Yes
H44YUB5570CN	SABER ATS	2-5W	403-512MHz	Yes	No	No	Yes

- 3 On page 3, add the following:

FOR USE IN HAZARDOUS ATMOSPHERES

Factory Mutual Non-Incendive and Intrinsically Safe Approved Models

The SYSTEMS SABER I and III, and SABER ATS portable radios must be properly equipped with a Factory Mutual (FM) Corporation approved battery to be considered "intrinsically safe."

The FM options for the radio provide a label which lists the Class/Division/Group, verifies the radio as being FM approved, and states the type of battery to be used with the radio.

The intrinsically safe rating by Factory Mutual states that electrical equipment is incapable of releasing sufficient electrical or thermal energy, under normal or abnormal operating conditions, to cause ignition of specific hazardous atmospheres designated on the radio label.

WARNING

Substitution of components may impair the intrinsic safety of the radio.

Note

Radios must be shipped from the Motorola factory equipped with the hazardous atmosphere option; they *cannot* be modified in the field.

Failure to use the radio with an approved battery will negate the FM approval. Factory Mutual approved radios can be used in those applications requiring reliable, two-way hand-held radios in the listed specific hazardous atmospheres. Motorola approved equipment and accessories are listed in the approval guide published yearly by Factory Mutual Corporation.

- 4 On page 10, change **Table 2. Modulation /Squelch Modes** to read as follows:

Mode	Audio Indication	Display Indication	Transmit Modulation Functions	Receiver Squelch Function
1	1 bonk	Mode 1	Mic	RF Carrier Noise Squelch
2	2 bonks	Mode 2	Mic with PL	PL Squelched
3	3 bonks	Mode 3	Mic with DPL	DPL Squelch
4	4 bonks	Mode 4	Mic with Trunking connect Tone	PL Connect Tone 105.88 Hz
5	5 bonks	Mode 5	High-Speed Trunking Data; 900 Hz Square Wave	RF Carrier Noise Squelch
6	6 bonks	Mode 6	MDC Encode Data, 1500 Hz Tone	RF Carrier Noise Squelch

- 5 On page 11, change existing information in **Table 3. Transmitter Performance Checks in Air Test Mode** to read as follows:

Test Name	Instructions	Specifications
Tx Modulator Limiting		5 kHz maximum deviation (25 kHz channel spacing) 2.5 kHz maximum deviation (12.5 kHz channel spacing)
Tx Modulator Sensitivity	Apply 1 kHz tone (25 kHz channel spacing) or 1.5 kHz tone (12.5 kHz channel spacing). Adjust audio input level for 3.0 kHz deviation.	
Tx PL Deviation		0.5-1.0 kHz deviation (25 kHz channel spacing) 0.2-0.5 kHz deviation (12.5 kHz channel spacing)
Tx Modulator Limiting with PL and Voice		5 kHz maximum deviation (25 kHz channel spacing) 2.5 kHz maximum deviation (12.5 kHz channel spacing)
Tx Connect Tone Deviation		0.8-1.2 kHz deviation (25 kHz channel spacing) 0.4-0.6 kHz deviation (12.5 kHz channel spacing)
Tx Modulator Limiting with DPL and Voice		5 kHz maximum deviation (25 kHz channel spacing) 2.5 kHz maximum deviation (12.5 kHz channel spacing)
Tx DPL Deviation		0.5-1.0 kHz deviation (25 kHz channel spacing) 0.2-0.5 kHz deviation (12.5 kHz channel spacing)
Tx Modulator Limiting with DPL and Voice		5 kHz maximum deviation (25 kHz channel spacing) 2.5 kHz maximum deviation (12.5 kHz channel spacing)
Tx High Speed Data Deviation		2.4-3.6 kHz deviation (25 kHz channel spacing) 1.2-1.8 kHz deviation (12.5 kHz channel spacing)

- 6 On page 12, change existing information in **Table 4. Receiver Performance Checks in Air Test Mode** to read as follows:

Test Name	Specifications
Rx Sensitivity	0.35 μ V maximum (-116dBm)(25 kHz channel spacing) 0.5 μ V maximum (-113dBm)(12.5 kHz channel spacing)

- 7 On page 13, change existing information in **Table 5. Alignment Setup and Specifications** to read as follows:

Test Name	Tune Target		Test Limits	
Deviation Limit			3.9-4.8 kHz (25 kHz channel spacing) 2.0-2.4 kHz (12.5 kHz channel spacing)	
Signalling Deviations	<i>25 kHz Channel Spacing</i>	<i>12.5 kHz Channel Spacing</i>	<i>25 kHz Channel Spacing</i>	<i>12.5 kHz Channel Spacing</i>
DTMF with Connect Tone:	4.0 kHz Nominal	2.0 kHz Nominal	3.3-4.7 kHz	1.8-2.2 kHz
DTMF Only:	3.0 kHz Nominal	1.5 kHz Nominal	2.5-3.5 kHz	1.2-1.8 kHz
DTMF with PL:	3.75 kHz Nominal	1.8 kHz Nominal	3.0-4.5 kHz	1.5-2.3 kHz
ISW Only:	3.0 kHz Nominal	1.5 kHz Nominal	2.4-3.6 kHz	1.2-1.8 kHz
DVP Only:	4.0 kHz Nominal	Not Applicable	3.5-4.5 kHz	Not Applicable

8 On page 16, SYSTEMS SABER UHF SECURENET Electrical Parts List, change the following:

REF. SYM.	MOTOROLA PART NO.	ACTION	MOTOROLA PART NO.	DESCRIPTION
C49		add	2113741A21	1000pF±5%
FL2	9105685Q05	changed to	9105685Q05	Ceramic; 450kHz; 20kHz BW (25kHz channel spacing only)
		add or	9105685Q06	Ceramic; 450kHz; 15kHz BW (12.5kHz channel spacing only)
P5	3905446Q03	changed to	REX-4166A	Plug: Contact Antenna
R5	0660078T01	changed to	0660076E73	Resistor: 10k
R216	0660076A73	changed to	0660076E73	10k
R217	0660076A73	changed to	0660076E73	10k
R219	0660076E85	changed to	0660079J33	20k±1%
R222	0660076A73	changed to	0660076E73	10k
R225	0660076A73	changed to	0660076E73	10k
R405	0660076A73	changed to	0660076E73	10k
R406	0660076A73	changed to	0660076E73	10k
R412	0660078L01	changed to	0660079K02	100±1%
R413	0660078L01	changed to	0660079K02	100±1%
R414	0660078T01	changed to	0660076E73	10k
R416	0660078L01	changed to	0660079K02	100±1%
R425	0660076A73	changed to	0660076E73	10k
R500	0660076A73	changed to	0660076E73	10k
U2	NLE9432A	changed to	NLE9431A	Filter/Amp/Mixer (403-433MHz)
		or	NLE9432A	Filter/Amp/Mixer (440-470MHz)
		or	NLE9433A	Filter/Amp/Mixer (446-449MHz)
		or	NLE9434A	Filter/Amp/Mixer (482-512MHz)
		or	NLE9501A	Filter/Amp/Mixer (403-433MHz)(12.5 kHz channel spacing only)
		or	NLE9502A	Filter/Amp/Mixer (440-470MHz)(12.5 kHz channel spacing only)
U202	NLE9472A	changed to	NLE9471A	5W Power Amplifier (403-433 MHz)
		or	NLE9472A	5W Power Amplifier (440-470 MHz)
		or	NLE9473A	5W Power Amplifier (460-490 MHz)
		or	NLE9474A	5W Power Amplifier (482-512 MHz)
		or	NLE9483A	2W Power Amplifier (440-470 MHz)
		or	NLE9741A	2W Power Amplifier (403-433 MHz)
U203	NFE6061A	changed to	NFE6061A	Filter/Detector/Switch (403-470 MHz)
		or	NFE6062A	Filter/Detector/Switch (470-512 MHz)
U300	NLE9462A	changed to	NLE9461A	VCO/Synthesizer (403-433 MHz)
		or	NLE9462A	VCO/Synthesizer (440-470 MHz)
		or	NLE9463A	VCO/Synthesizer (460-490 MHz)
		or	NLE9464A	VCO/Synthesizer (482-512 MHz)

NONREFERENCED ITEMS

8405334T01 changed to 8405424U01 PC BOARD, MAIN

- 9 On page 16, **SYSTEMS SABER Controller Board Electrical Parts List**, change the following:

<u>REF.</u> <u>SYM.</u>	<u>MOTOROLA</u> <u>PART NO.</u>	<u>ACTION</u>	<u>MOTOROLA</u> <u>PART NO.</u>	<u>DESCRIPTION</u>
R518	0660076A73	changed to	0660076E73	10k
R523	0660076A73	changed to	0660076E73	10k
R524	0660079U73	changed to	0660076A49	1k
R534	0660076A73	changed to	0660076E73	10k
R536	0660076A73	changed to	0660076E73	10k
U503	5105226P39	changed to	0105951R14	RAM; 8k x 8
U505	5195007D01	changed to	5195007D05	EPROM; 128k x 8
	6105534T01	changed to	6105520U01	LIGHTPIPE

- 10 On page 18, **SYSTEMS SABER I SECURENET UHF Exploded ViewI Parts List**, change the following:

<u>REF.</u> <u>SYM.</u>	<u>MOTOROLA</u> <u>PART NO.</u>	<u>ACTION</u>	<u>MOTOROLA</u> <u>PART NO.</u>	<u>DESCRIPTION</u>
25	NLE9911A	changed to	NLE4200A	ASSEMBLY, UHF Main PC Board (25kHz Channel Spacing)
		or	NLE4242A	ASSEMBLY, UHF Main PC Board (12.5kHz Channel Spacing)
33	NTN4595B	changed to	NTN4595C	BATTERY, 1500mAh
59	2605682U01	changed to	2605897T01	SHIELD, LCD Board
60	NTN5963A	changed to	0105950S84	ASSEMBLY, Controller PC Board (SYSTEMS SABER I)
61	8405681U01	changed to	8405328T01	FLEX CIRCUIT, LCD Interconnect

- 11 On page 18, **SYSTEMS SABER III SECURENET UHF Exploded View Parts List**, change the following:

<u>REF.</u> <u>SYM.</u>	<u>MOTOROLA</u> <u>PART NO.</u>	<u>ACTION</u>	<u>MOTOROLA</u> <u>PART NO.</u>	<u>DESCRIPTION</u>
33	NTN4595B	changed to	NTN4595C	BATTERY, 1500 mAh
49	8460999B03	changed to	0105950S85	ASSEMBLY, Controller PC Board (SYSTEMS SABER III)(Includes Item 48)



MOTOROLA INC.

MANUAL REVISION

for
Manual No. 68P81066C95-O
SYSTEM SABER™ SECURENET
Portable Radios
Service Manual

This revision outlines changes that have occurred since the printing of your manual. Use this information to supplement your manual. Installation of these changes in earlier equipment is not necessary except as recommended in Motorola Service and Repair Notes (SRN's).

REVISION DETAILS

<u>NO.</u>	<u>CHANGE AFFECTS</u>
1	SPECIFICATIONS
2	ELECTRICAL PARTS LIST
3	CONTROLLER CIRCUIT BOARD LAYOUT DIAGRAM

CHANGES

NO.

- 1 On page 1, SPECIFICATIONS, change the following as indicated:

GENERAL

FREQUENCY RANGE: 403 -512MHZ

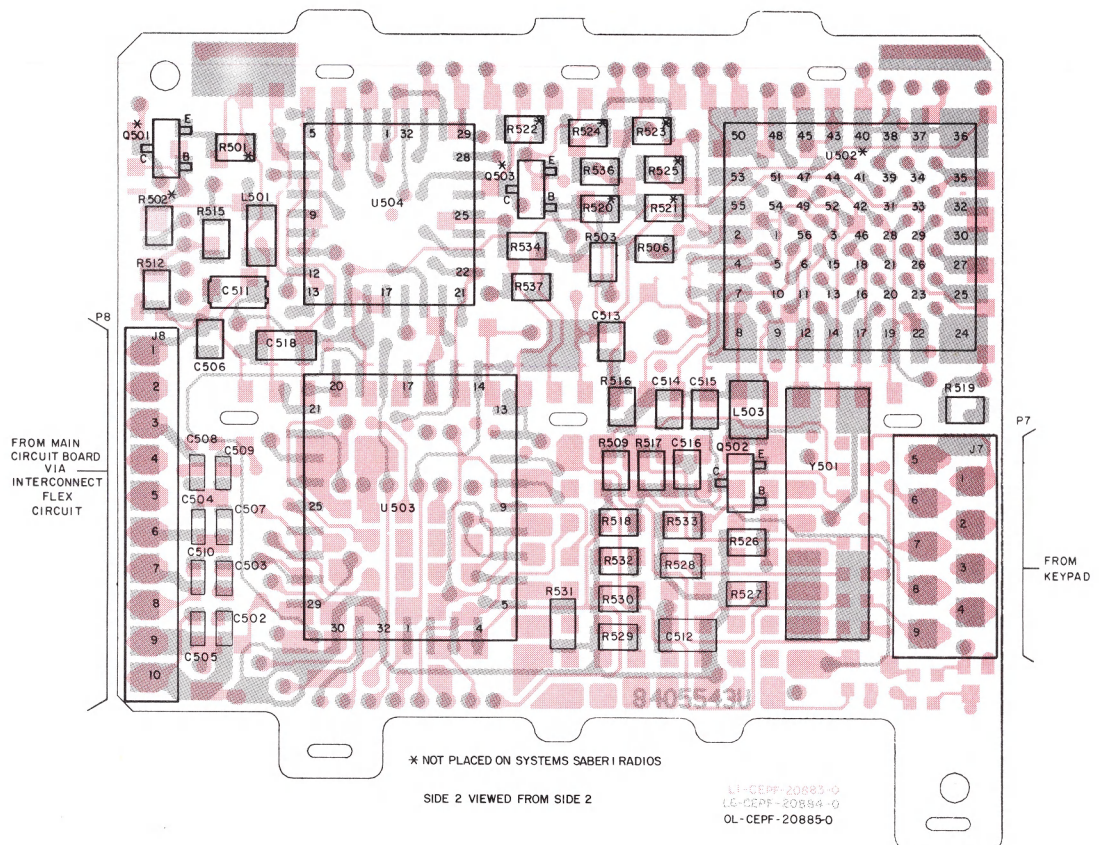
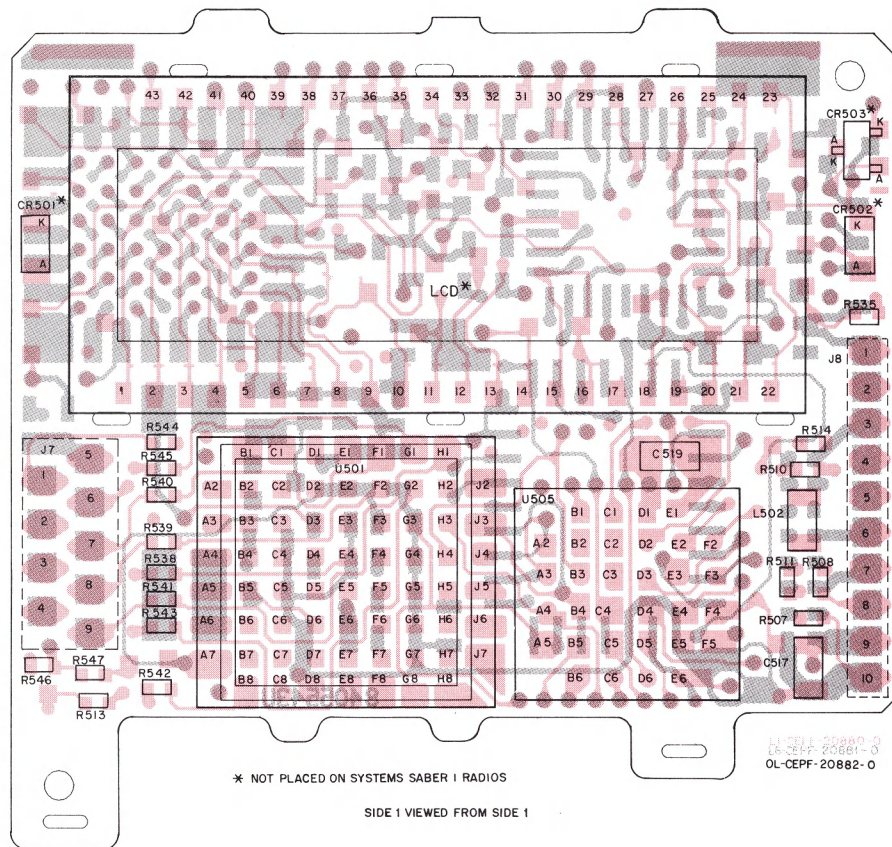
BANDSPLITS:

403 - 433MHZ
440 - 470MHz
460 - 490MHz
482 - 512MHz

- 2 On page 16, under ELECTRICAL PARTS LIST, TPLF- 3925-O, change the following:

<u>NO.</u>	<u>ACTION</u>	<u>MOTOROLA PART NO.</u>	<u>DESCRIPTION</u>
C409	change to	2160527B25	.01 ± 10%
R219	change to	0660076E80	20k ±1%

- 3 On page 17, CONTROLLER CIRCUIT BOARD COMPONENT LAYOUT DIAGRAM AND CONTROLLER BOARD SCHEMATIC DIAGRAM, replace the COMPONENT LAYOUT DIAGRAMS with the following DIAGRAMS:



SYSTEMS SABER™
SECURENET™
Handie-Talkie® Portable Radios
403 - 512 MHz

service
manual
revision

GENERAL:

This revision outlines changes that have occurred since the printing of your service manual. Use this information to correct your manual.

SERVICE MANUAL AFFECTED:

68P81066C95-O

SYSTEMS SABER™ SECURENET™ 403 - 512 MHz Service Manual

REVISION DETAILS:

SABER has a new baseplate and conductive pad that greatly enhances its transmit capabilities. This supplement contains new parts lists and exploded view drawings necessary for servicing the radio. Please refer to the following revisions and change your manual accordingly.

<u>Change No.</u>	<u>Change Affects</u>	<u>Service Manual</u> <u>Page number</u>
1	SYSTEMS SABER Controller Board Electrical Parts List	16
2	SYSTEMS SABER I SECURENET UHF Exploded View Drawing	18
3	SYSTEMS SABER I SECURENET UHF Exploded View Parts List	18
4	SYSTEMS SABER III SECURENET UHF Exploded View Parts List	18
5	SYSTEMS SABER III SECURENET UHF Exploded View Drawing	18

CHANGE I

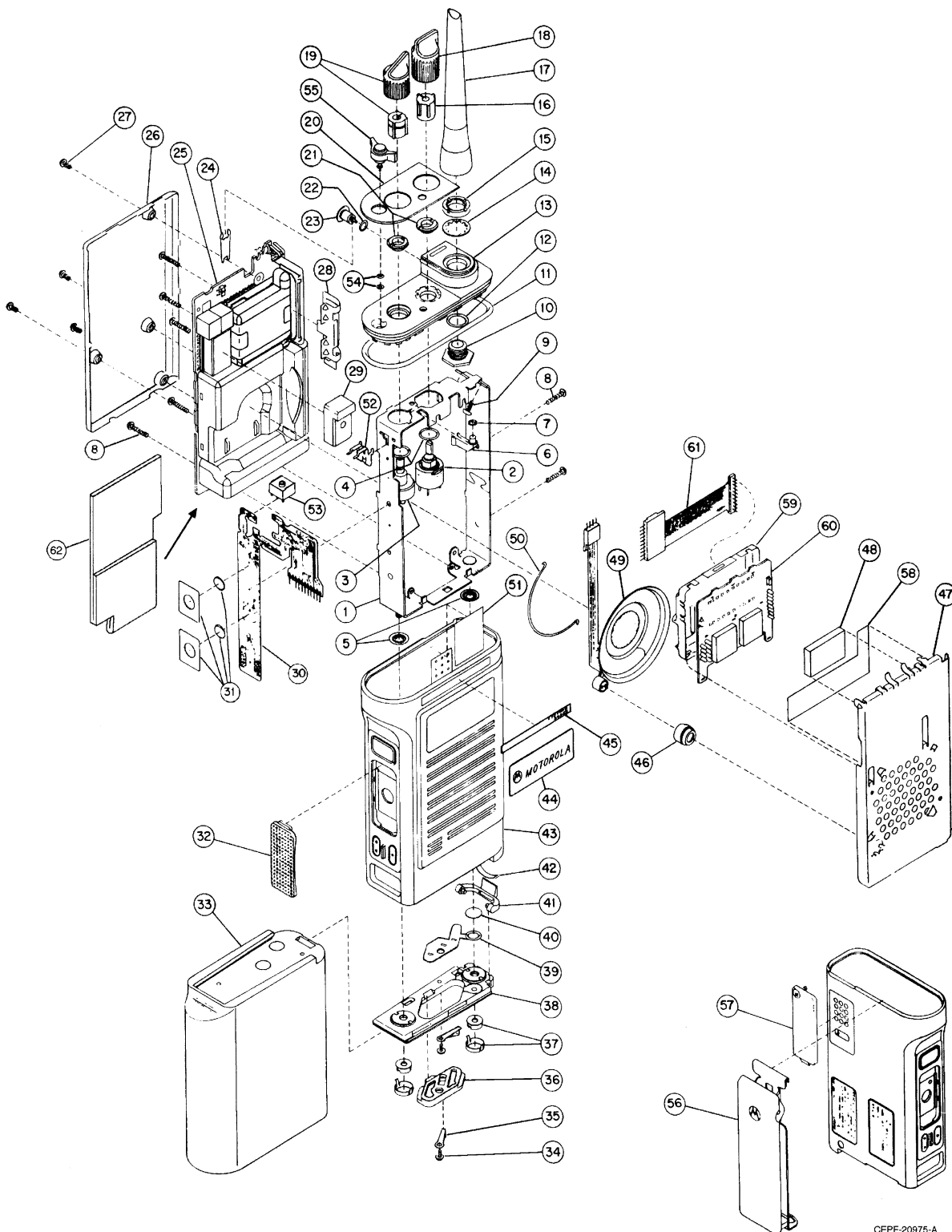
SYSTEMS SABER Controller Board
Electrical Parts List

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
U501	5102226J20	Microprocessor, HCMOS
U502	NO CHANGE	NO CHANGE
U503	5105457W48	RAM; 8k x 8
U504	5105457W23	EEPROM; 8k x 8
U505	5107008D07	EPROM; 128k x 8



CHANGE 2

Please note the changes in the SYSTEMS SABER I UHF Exploded View Drawing:



CHANGE 3

SYSTEMS SABER I SECURENET UHF Exploded View Parts List

ITEM NO.	MOTOROLA PART NO.	DESCRIPTION
1 through 33	NO CHANGES	NO CHANGES
34	0305371J22	SCREW, Baseplate, Ph Pan Hd; (2 req'd) (part of item 43)
35	3905253X01	CONTACT, Power (2 req'd) (part of item 43)
36	NO CHANGE	NO CHANGE
37	NO CHANGE	NO CHANGE
38	6405847N05	BASEPLATE (part of item 43)
39	3205783T02	SEAL, Elastomer (part of item 43)
40 through 61	NO CHANGES	NO CHANGES
62	7505262Z02	PAD, Conductive Conformable

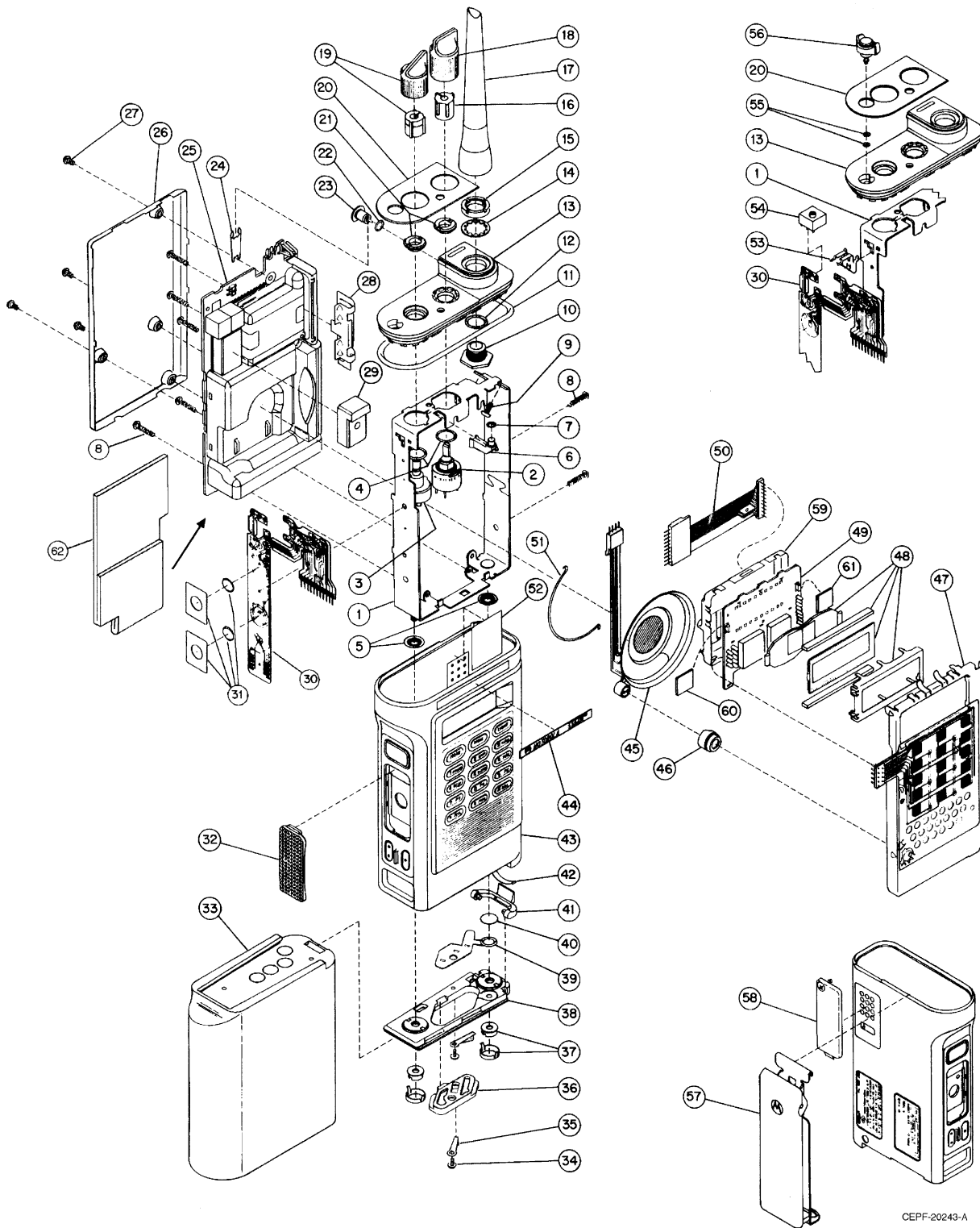
CHANGE 4

SYSTEMS SABER III SECURENET UHF Exploded View Parts List

ITEM NO.	MOTOROLA PART NO.	DESCRIPTION
1 through 33	NO CHANGES	NO CHANGES
34	0305371J22	SCREW, Baseplate, Ph Pan Hd; (2 req'd) (part of item 43)
35	3905253X01	CONTACT, Power (2 req'd) (part of item 43)
36	NO CHANGE	NO CHANGE
37	NO CHANGE	NO CHANGE
38	6405847N05	BASEPLATE (part of item 43)
39	3205783T02	SEAL, Elastomer (part of item 43)
40 through 61	NO CHANGES	NO CHANGES
62	7505262Z02	PAD, Conductive Conformable

CHANGE 5

Please note the changes in the SYSTEMS SABER III UHF Exploded View Drawing:





SYSTEMS SABER™
SECURENET™
Handie-Talkie® Portable Radio
403 - 512 MHz

SPECIFICATIONS

GENERAL	TRANSMITTER	RECEIVER
FREQUENCY RANGE: 403-512MHz POWER SUPPLY: Rechargeable Nickel-Cadmium Battery or Primary Battery BATTERY VOLTAGE: Nominal: 7.5Vdc Range: 6 to 9Vdc TEMPERATURE RANGE Operating: -30°C to +60°C Storage: -40°C to +85°C DIMENSIONS (HXWXD) Less Battery: 4.42"x2.94"x1.18" (112.27x74.67x29.97 mm) With Medium-Capacity Battery: 7.56"x2.94"x1.18" (192.02x74.67x29.97 mm) With Ultra-High-Capacity Battery: 8.32"x2.94"x1.18" (211.33x74.67x29.97 mm) WEIGHT <div>Keypad Less Battery: 12.57 oz. (357 g) With Medium-Capacity Battery: 24.23 oz. (688 g) With Ultra-High-Capacity Battery: 25.85 oz. (734 g)</div> <div>Non-Keypad Less Battery: 12.22 oz. (347 g) With Medium-Capacity Battery: 23.87 oz. (678 g) With Ultra-High-Capacity Battery: 25.49 oz. (724 g)</div>	RF POWER OUTPUT 2 or 5 Watts FREQUENCY STABILITY (-30°C to +60°C; +25°C REF): ±.0002% MODULATION: Types 20K0F3E (±5kHz for 100% 20K0F1D modulation @ 1000Hz) 20K0F2D FM HUM AND NOISE (COMPANION RECEIVER): -45dB SPURIOUS EMISSION (CONDUCTED AND RADIATED) 2.0W: -70dBc 5.0W: -74dBc AUDIO DISTORTION: 3% Maximum AUDIO FREQUENCY RESPONSE: +1,-3dB (6dB/OCTAVE PRE-EMPHASIS; 300-3000Hz) MAXIMUM FREQUENCY SEPARATION: Full Bandsplit (NO DEGRADATION)	SENSITIVITY 20dBQ: 0.4µV Max. 12dBS: 0.3µV Max. Squelch (Programmable): 0.25µV Max. SELECTIVITY: Adjacent channel: -75dB Fourth channel: -80dB INTERMODULATION: -72dB USEABLE BANDWIDTH: 5kHz FM HUM AND NOISE: 40dB FREQUENCY STABILITY (-30°C to +60°C; +25°C REF.): ±.0003% AUDIO SPL (AT 30 cm WITH RATED AUDIO): Weighted, 300-3000Hz 87dB Nominal RATED AUDIO OUTPUT: 500mW (At less than 5% distortion) CHANNEL SPACING: 25kHz MAXIMUM FREQUENCY SEPARATION: Full Bandsplit (NO DEGRADATION)
SECURENET		
SCRAMBLE TYPE: Digital ENCRYPTION METHOD: Multi-Register, Non-Linear Combiner ENCRYPTION KEY INITIALIZATION: Random ENCRYPTION KEY GENERATION: External, Hand-Held Microprocessor-Controlled Key loader Volatile Electronic Memory KEY STORAGE: One NUMBER OF KEYS PER RADIO: Continuously-Variable Slope Delta ANALOG-TO-DIGITAL CONVERSION: (CVSD) Modulation VOICE SAMPLE RATE: 12 Kilobits/Second		

All specifications are per EIA RS316B, unless noted
Specifications are subject to change without notice

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MODEL CONFIGURATION

FACTORY ID	POWER LEVEL	FREQ.	SUBMERSIBLE	KEYPAD	DISPLAY
H34TUN5170CN	1W-2W	403-512MHz	NO	None	None
H44TUN5170CN	2W-5W	403-512MHz	NO	None	None
H34YUN5170CN	1W-2W	403-512MHz	YES	None	None
H44YUN5170CN	2W-5W	403-512MHz	YES	None	None
H34TUK5170CN	1W-2W	403-512MHz	NO	3x5	LCD
H44TUK5170CN	2W-5W	403-512MHz	NO	3x5	LCD

SPECIALIZED TOOLS AND TEST EQUIPMENT

SERVICE AIDS

NTN4720A	SECURENET Bypass Module
REN-4001A	Housing Eliminator (Allows key loading through the cable)
RPX-4665A	Field Modification Kit/RTX-4005A
RSX-4043A	Rotatorq Tool
RTK-4203A	Program/Test Cable
RTK-4208A	RF Coaxial Probe
RTL-4224A	Battery Eliminator
RTL-4238A	RF Cable
RTX-4005B	Portable Products Test Set
TKN8506A	Keyload Cable (Hand-held key loader to radio)
0180370B85 thru B86	Ungar Table Fixtures
0180386A81	Micro-Tip Soldering Iron
0180386A82	Static Protection Kit
5880348B33	SMA-BNC Adapter for RTL-4208A Probe
6680321B79	Phillips-Head Rotatorq Bit
6680334B48 thru B52	Ungar Service Heads
6680370B88	Frequency and On/Off Switch Spanner Nut Rotatorq Bit
6680370B89	Baseplate Spanner Nut Rotatorq Bit
6680370B90	Antenna Bushing Spanner Nut Rotatorq Bit
6680385A11	Module Extractor
6680387A59	Leadless Component Extractor
6680387A64	Heat Controller With Safety Stand
8407264N02	SYSTEMS SABER Controller Extender Cable (10-pin)

TEST EQUIPMENT

R-1053A	Dual-Trace Oscilloscope
R-2045D	Communications Systems Analyzer with Secure Voice Option
S-1339A	RF Millivoltmeter
S-1347D	Power Supply
RTK-4237A	Battery Tester
RTL-4223A	Charger Tester

FIELD PROGRAMMING EQUIPMENT

RVN-4051A	SYSTEMS SABER Field Programmer Software on 5 1/4-inch 360k Double-Density Disk
RVN-4052A	SYSTEMS SABER Field Programmer Software on 3 1/2-inch Disk
0180353A74	Radio Interface Box (RIB)
0180357A57	RIB Wall-Mounted Power Supply
3080369B71	Computer Interface Cable (PC-AT), 25-pin
3080369B72	Computer Interface Cable (PC-XT), 9-pin
68P81060C25	SYSTEMS SABER Field Programmer User's Guide

CLEANING

- Clean all external radio surfaces with a 0.5% solution of a mild dishwashing detergent in water (one teaspoon of detergent per gallon of water).
- Stronger cleaning agents may only be used to remove soldering flux from circuit boards after making repairs.
- Clean internal surfaces with water-activated optical wipes.

CAUTION

Never allow any alcohol- or solvent-based product to contact any plastic or rubber radio part.

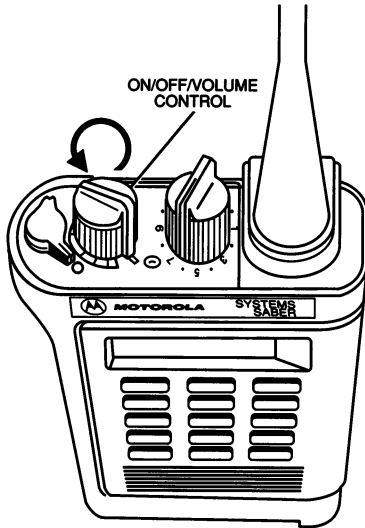
RELATED PUBLICATIONS AVAILABLE SEPARATELY

SYSTEMS SABER I/III SECURENET OPERATING INSTRUCTIONS	68P81060C10
SYSTEMS SABER SECURENET THEORY/ MAINTENANCE MANUAL	68P81060C20
SYSTEMS SABER FIELD PROGRAMMER USER'S GUIDE	68P81060C25
SYSTEMS SABER SECURENET SERVICE MANUAL (VHF)	68P81067C10

DISASSEMBLY/REASSEMBLY PROCEDURES

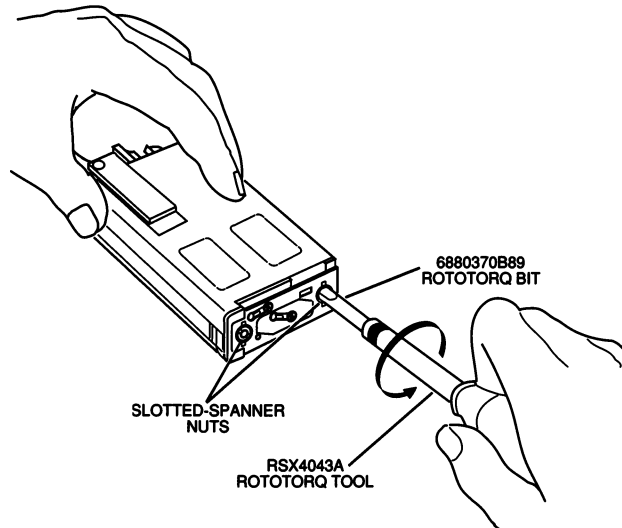
1. DISASSEMBLY

- a. **Turn off the radio** by rotating the on/off/volume control knob fully counterclockwise until you hear a click. Remove the universal connector cover or any accessory connected to the radio before beginning disassembly.



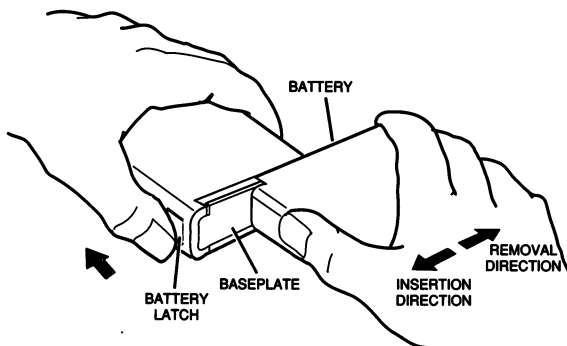
MAEPF-20609-O

- c. **Loosen the two slotted-spanner nuts** on the bottom of the radio using Rotatorq tool bit No. 6680370B89. When loosened, the slotted-spanner nuts are captive and will spin freely without separating from the baseplate.



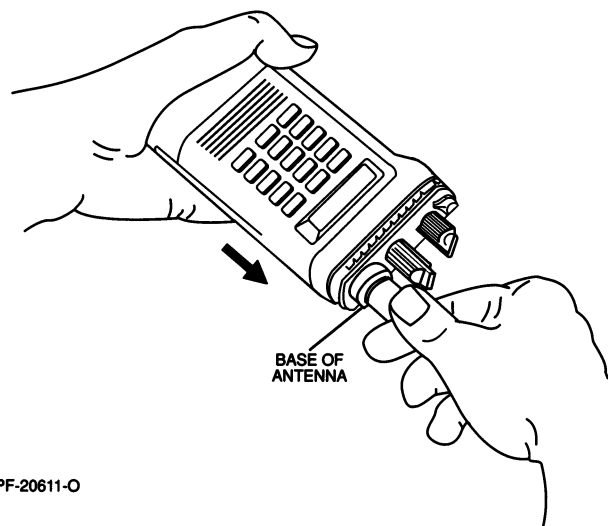
MAEPF-20610-O

- b. **Remove the battery** from the baseplate on the bottom of the radio housing by pushing the spring-loaded battery latch toward the top of the radio, and sliding the battery away from the latch until it clears the baseplate.



MAEPF-20185-O

- d. **Remove the frame assembly** from the radio housing by grasping the antenna at its base and pulling it gently upward. *Do not depress the PTT switch during removal and do not push on the slotted-spanner nuts to lift the frame assembly.*

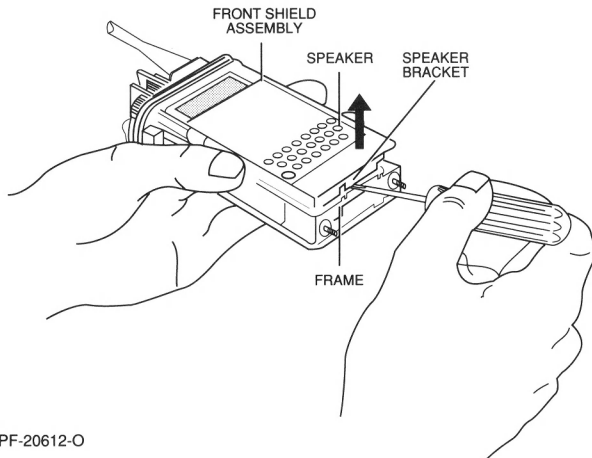


MAEPF-20611-O

CAUTION

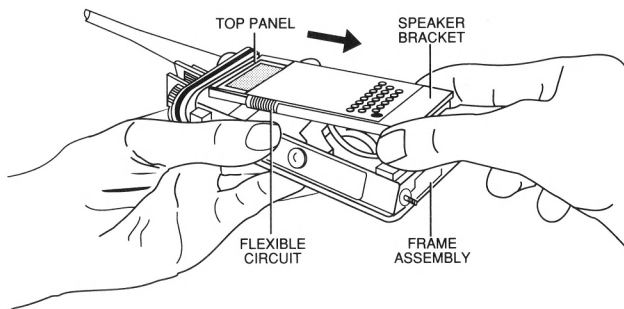
Ensure that all static electricity safeguards are in place.

- e. With the speaker facing upward, **remove the speaker bracket assembly** by inserting a thin screwdriver blade between the frame and the bottom of the speaker bracket, and prying gently upward on the speaker bracket until it is disengaged from the frame.



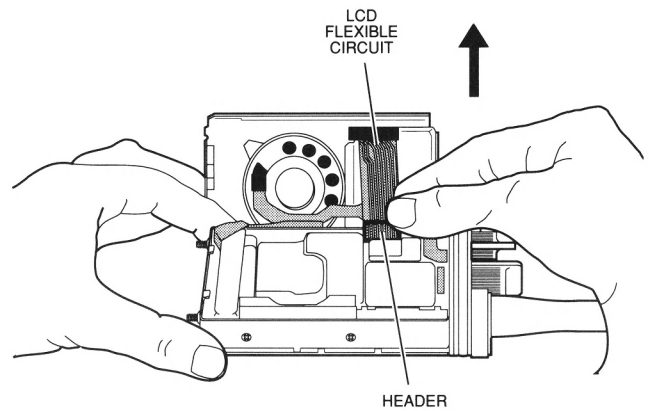
MAEPF-20612-O

- f. **Lift the speaker bracket assembly** away from the bottom of the frame assembly, then pull it out from under the plastic top panel. Be careful not to pull against the flexible circuits connecting the speaker bracket to the frame assembly.



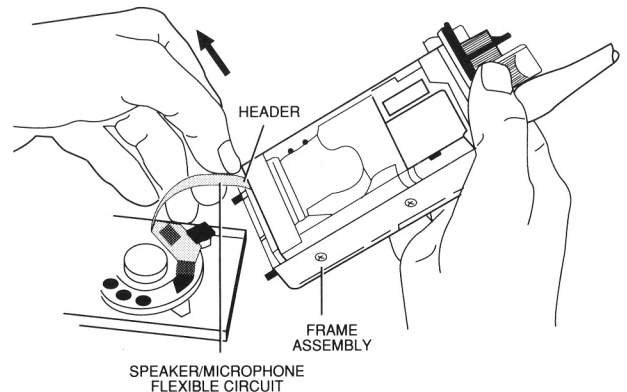
MAEPF-20613-O

- g. **Disconnect the interconnect flexible circuit** from the frame assembly by pulling the header straight out and away from the main printed circuit board.



MAEPF-20614-O

- h. **Disconnect the speaker/microphone flexible circuit** from the frame assembly by pulling the connector straight out and away from the main printed circuit board.



MAEPF-20615-A

CAUTION

Refer to "SERVICING MAJOR SUBASSEMBLIES" (Section 2) and the appropriate exploded view diagrams at the back of this manual before attempting further disassembly or repair.

2. SERVICING MAJOR SUBASSEMBLIES

a. Baseplate

- All repairs to the baseplate assembly can, and should, be made with the radio chassis inside the radio.
- After the slotted-spanner nuts are loosened, the baseplate is held in place by the power contact screw.
- The retainers holding the slotted-spanner nuts in place are not reusable. Replacement of the retainers requires special insertion procedures; refer to the instruction sheet provided with the slotted-spanner nut kit.
- The "o-ring" portion of the elastomer seal must be fully seated on the threaded bushing before the baseplate is reassembled (the bushing is part of the housing assembly).

b. Housing Assembly

- The housing assembly includes many parts that are not replaceable or repairable.
- The insulator on the universal connector can, and should, be replaced if the old insulator has been torn. When replacing the insulator take care to keep it out of the main seal o-ring's seating area.
- The PTT lever can be replaced by prying out the old part with a soft plastic tool. The plastic housing around the lever may be damaged if a harder tool is used.

c. Control Top Panel

- The control top panel is fastened to the frame by the on/off/volume and frequency switches, and two self-tapping screws; it should be removed from the frame only if absolutely necessary. If repair is required, always start the screws into the control top panel by hand before tightening them with a torque wrench; this will help avoid cross-threading and stripping of the plastic panel.
- The on/off/volume and frequency knobs are 2-part kits; each kit consists of a knob and an insert. Once an insert is removed, it cannot be used again; therefore, remove an insert only if the on/off/volume control or frequency switch must be replaced, or if the control top must be removed from the frame.

d. LCD/Speaker Bracket Assembly

The SYSTEMS SABER radio's LCD assembly and/or controller board can be replaced, but the comments and cautions in this manual must be strictly followed.

(1) Removing the LCD Assembly and Controller Board:

- (a) With the LCD/speaker bracket assembly facing downward, unplug the LCD interconnect flexible circuit from the controller board by inserting a thin-bladed screwdriver between the header and the controller board, and gently prying upward on the header until it is free from the board.
- (b) (SYSTEMS SABER III only) After ensuring that all static safeguards are in effect, turn the LCD/speaker bracket assembly over (display facing up), insert a thin plastic blade (such as a tuning wand) between the top edge of the keypad membrane switch and the LCD bezel, and break the adhesive bond between the bezel and the membrane switch.
- (c) Turn the assembly over (front shield facing down) and, using a thin-bladed screwdriver, gently pry the controller board away from the two speaker bracket tabs (the tabs next to the speaker).
- (d) Place your middle finger on the top center tab and your thumb on the bottom left tab of the controller board, and gently pry the shield/controller board assembly away from the front shield.
- (e) Gently lift the shield/controller board assembly away from the front shield, rotating it around the front shield until the keypad flexible circuit lies flat and the display is facing upward.
- (f) Insert a thin-bladed screwdriver between the plug on the keypad flexible circuit and the controller board, and gently pry upward on the plug until it is free from the board.
- (g) With the controller board facing upward, locate the retaining tab on the top edge of the controller board and deflect the shield near the tab while lifting the board up and away from the shield. The circuit board and interconnect flexible circuit can then be pulled forward and out.

(2) Replacing the LCD Assembly
(SYSTEMS SABER III Only):

- (a) With the display facing downward, locate and carefully straighten the six bent-over metal tabs holding the LCD assembly to the controller board, then separate the LCD assembly from the board.
- (b) Inspect the two rows of LCD contacts on the controller board for damage and/or foreign material, and clean if necessary.
- (c) Using finger cots, inspect the new LCD assembly for fingerprints or other foreign material. Clean, if necessary, only with water-activated optical wipes.
- (d) After first making sure that the lens shipping protection has been removed, insert the new LCD assembly so that the viewing side of the display shows through the window in the bezel, and the seal on the display fits into the corresponding recess in the bezel.
- (e) Insert the LCD lightpipe into the bezel with the clear side facing the back of the display.
- (f) Position the elastomers along the top and bottom edges of the LCD lightpipe so that the conductive black dots on the elastomers connect the LCD to the contacts on the controller board.
- (g) Place the controller board over the metal tabs on the LCD bezel and, while applying firm, even pressure to fully seat the LCD assembly into the controller board, bend all the tabs inward.

e. Backshield Assembly

- Before removing the backshield, ensure that all static electricity safeguards are in place.
- For best results, loosen/tighten all four screws lightly before loosening/tightening any single screw completely.
- The backshield screws are held captive in the shield after being loosened.

f. Circuit Boards and Modules

- All modules plug into sockets on the main circuit board.

- Some modules are fastened to the main board and frame with screws; remove these screws before attempting to unplug a module. **Never** substitute any screw.
- Several of the modules are designed to be removed with a standard DIP extractor tool (OK-1 or equivalent). Always use the extractor tool when removing these modules to avoid damaging their leads.
- Some modules have guide pins to assist in insertion or removal. Pressure may be applied to these guide pins to aid removal of a module if, and only if, it is distributed evenly over all guide pins on the module. *Applying all the force to a single guide pin will cause severe damage to the module.*
- The secure module (U900) is not serviceable.
- Before reinserting any module, always check its leads for damage. Gently straighten any leads that may be bent; replace any modules with severely damaged leads.
- Before reinserting reference oscillator module U301 into the main circuit board, be certain that its squared (pin 1) corner is correctly oriented per the main circuit board component layout diagram.
- When electrically testing and/or probing the main circuit board with the back shield removed, always use the three finger screws on the SYSTEMS SABER housing-eliminator service-aid-to-provide grounding to VCO synthesizer module U300 (two places), and the rf ground clip (one place).
- When removing the main circuit board from the frame assembly, do the following:
 1. Remove the back shield assembly.
 2. Unplug the PTT/controls flexible circuit.
 3. Remove the two power amplifier module (U202) screws from the frame.
 4. Remove secure module U900.
 5. Remove the two main compression connector screws.
 6. Lift the board at the bottom and pull out from under the control top panel.
- The rf and ground contacts at the top of the main circuit board are exposed when the board is removed from the frame. Special care must be taken to avoid accidental damage to these contacts.

g. Frame Assembly

- The tapped tabs on the frame can be stripped if excessive screw tightening torques are used (see Torque Specifications table). The frame is not repairable.
- If you must lift or remove the PTT/controls flex circuit for any reason, do not readhere it to the frame; the flex must be replaced.

h. Dual-Function Switch (S801) and Actuator Assembly

- Before removing the switch, remove the knob by gently separating the two arms of the switch bracket (located between the switch and the main O-ring seal) and pulling upward on the knob.
- Before reinserting the knob, ensure that the slot in the switch is properly aligned with the blade on the knob's shaft.
- When the knob is properly inserted, the arms of the switch bracket will snap into position (approximately 0.2 inches apart), the knob will not be loose in the switch bracket, and the bracket will hold the switch firmly against the inside of the top control panel. If this is not the case, replace the switch bracket.

3. REASSEMBLY

Reassemble the radio in the reverse order of disassembly, referring to "SERVICING MAJOR SUB-ASSEMBLIES" (Section 2) and making certain:

- that the speaker/microphone connector and the LCD interconnect header are correctly aligned to the main circuit board so that no twisting or pinching of the flexible circuit occurs when the speaker bracket is reattached to the frame assembly.
- that all pads are correctly aligned.
- that the two extended tabs at the top of the speaker bracket are properly inserted into the slots between the frame and the control top panel.
- to tighten all hardware loosened or removed during disassembly per the torque specifications listed in the Torque Specifications table. Use recommended torque driver (Motorola RSX4043A Rotatorq Tool or equivalent).
- that there is no foreign material on the main O-ring or stud seals.

CAUTION

Inspect the frame stud seals and the top panel O-ring and replace if any damage exists.

- to properly orient the completed frame assembly before inserting it into the radio housing.
- *that the PTT switch and monitor button are not depressed while the frame is being inserted into the housing.*

TORQUE SPECIFICATIONS

APPLICATION	TORQUE (IN. LBS.)	TORQUE (N·m)	TORQUE BIT NO.
Antenna Bushing Spanner Nut	20	2.27	6680370B90
Back Shield to Frame Screws	2.5	0.28	6680321B79
Bottom Connector to Frame Screws	2.5	0.28	6680321B79
Frequency Switch Spanner Nut	8	0.91	6680370B88
All Module Screws	2.5	0.28	6680321B79
Power Contact Screws	2.5	0.28	6680321B79
Slotted-Spanner Nut (Baseplate)	6	0.68	6680370B89
Top Panel to Frame Screws	2	0.23	6680321B79
Volume Pot Spanner Nut	8	0.91	6680370B88

PERFORMANCE TESTS

1. TEST MODE

When the SYSTEMS SABER radio is operating in a trunking environment, it operates with a specific identity within an assigned system. Given commands from that system, the radio's internal microcomputer controls such functions as rf channel selection, transmitter key-up, and receiver muting.

However, when the unit is on the bench for testing, it is removed from this trunking environment. It cannot receive commands from its system and, therefore, the internal microcomputer will not key the transmitter or unmute the receiver. This prevents testing the radio in the normal manner unless it has been programmed on one or more conventional (non-trunked) channels. On one of these channels the unit may be tested in the normal mode allowed by the channel's programmed modes; for example, tone Private-Line® (TPL), Digital Private-Line™ (DPL), etc.

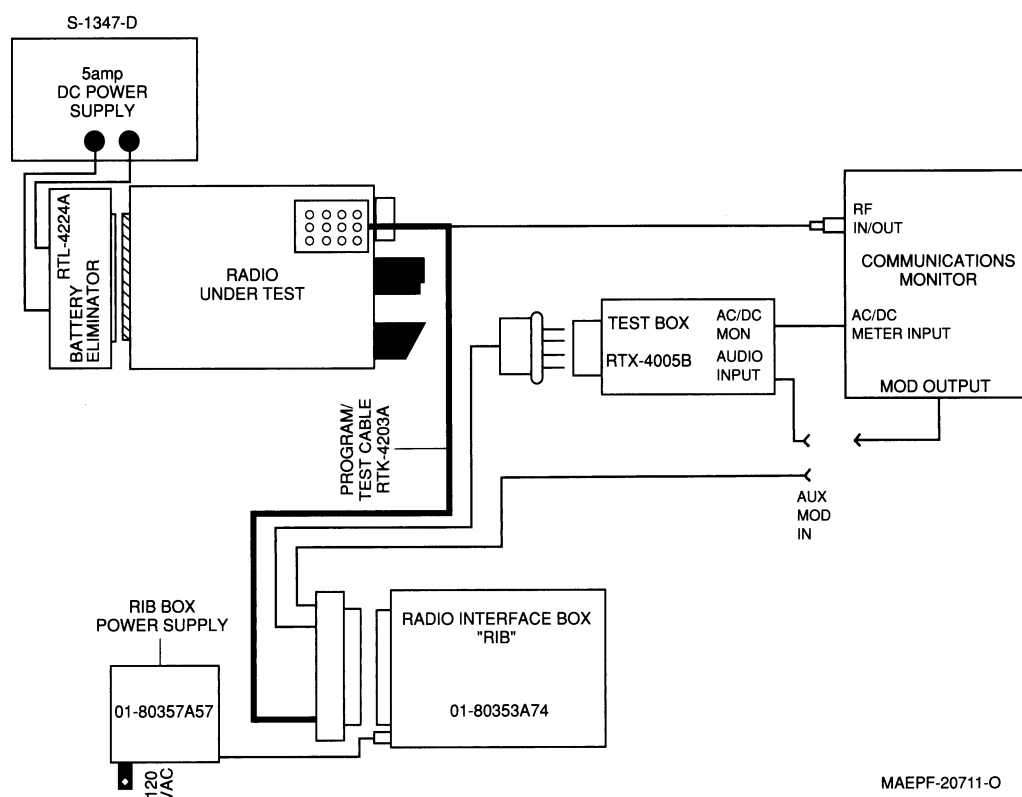
To allow for testing the radio in a more generic fashion, special test routines that allow manual control of the various modes of the unit have been provided for in the test mode called Air Test, which allows one to test various parameters without having to disassemble the radio. If adjustments are needed, the use of the field programmer, described in the SYSTEMS SABER Radio Service Software User's Guide, will be required.

To enter the Air Test mode, connect the equipment as shown in Figure 1, then do the following:

- Turn the radio off.
- Apply 7.5 volts to the radio battery contacts.
- Connect the radio to the RTX4005B portable test set via the test cable.
- Place the transmit mode switch on the test set in the **CONT** (transmit) position.
- Press and hold down the monitor button on the side of the radio.
- Turn the radio on and continue to hold down the monitor button for two seconds.
- Turn the transmit mode switch on the test set to the **OFF** position.

NOTE

- The unit will not transmit until the transmit mode switch has been turned off and then back to one of the transmit positions.
- Do not change modes or channels during Air Test while in the transmit mode.
- To exit Air Test turn the radio off.



MAEPF-20711-O

Figure 1. Air Test Setup

Air Test allows the testing of any combination of ten frequency pairs, two transmitter power levels, six modulation modes, and three receiver squelch modes. Selection of a frequency pair is done by rotating the rotary selector switch on top of the radio. See Table 1 for a listing of the Air Test transmit and receiver frequencies, and transmitter power output levels associated with the rotary selector switch.

To change modulation/squelch modes, press one of the "side button" switches on the side of the radio: pressing the button closest to the *front* of the radio (SB1) will *increment* the mode; pressing the button closest to the *back* of the radio (SB2) will *decrement* the mode. See Table 2 for a listing on the various modulation/squelch modes.

As the modulation/squelch mode is changed, a one- to six-"bonk" audio tone will be heard, and the display will indicate the mode by displaying the squelch mode number from one to six.

Table 1. Air Test

Rotary Selector Switch Position	406-433 Model Freqs. (MHz)		440-470 Model Freqs. (MHz)		460-490 Model Freqs. (MHz)		482-512 Model Freqs. (MHz)		Power Setting (Watts)	Maximum Transmitter Current (Amps)
	Tx	Rx	Tx	Rx	Tx	Rx	Tx	Rx		
1	403.05	418.25	440.05	455.25	460.05	475.25	482.05	497.25	5	3.3
2	406.05	406.25	443.05	440.25	463.05	460.25	485.05	482.25	2	2.1
3	409.05	432.85	446.05	469.85	466.05	489.85	488.05	511.85	2	2.1
4	412.05	412.05	449.05	449.05	469.05	469.05	491.05	491.05	5	3.3
5	416.05	416.05	453.05	453.05	473.05	473.05	495.05	495.05	2	2.1
6	420.05	432.85	457.05	469.85	477.05	489.85	499.05	511.85	5	3.3
7	424.05	432.85	461.05	469.85	481.05	489.85	503.05	511.85	2	2.1
8	427.05	432.85	464.05	469.85	484.05	489.85	506.05	511.85	5	3.3
9	430.05	432.85	467.05	469.85	487.05	489.85	509.05	511.85	5	3.3
10 thru 16	432.95	432.85	469.95	469.85	489.95	489.85	511.95	511.85	5	3.3

Note: The actual frequencies of the transmitter or receiver, and power-out setting of your unit may vary from the above table. If in doubt, please contact Motorola Portable Products Services at (305) 475-6170 during business hours EST.

Table 2. Modulation/Squelch Modes

Mode	Audio Indication	Display Indication	Transmit Modulation Functions(s)	Receiver Squelch Function
1	1 bonk	Mode 1	Mic	RF Carrier Noise Squelch
2	2 bonks	Mode 2	Mic with PL	PL Squelched
3	3 bonks	Mode 3	Mic with Trunking Connect Tone	RF Carrier Squelch
4	4 bonks	Mode 4	Mic with DPL	DPL Squelch
5	5 bonks	Mode 5	High-Speed Trunking Data; 900 Hz Square Wave	RF Carrier Noise Squelch
6	6 bonks	Mode 6	MDC Encode Data, 1500 Hz Tone	RF Carrier Noise Squelch

PL frequency = 192.8 Hz; DPL code = 131 non inverted; Connect tone = 105.88 Hz

2. PERFORMANCE CHECKS IN AIR TEST MODE

Tables 3 and 4 outline a series of performance checks that can be done without any disassembly of the radio. If there is an indication of a malfunction, these checks should be the first step in the fault isolation process. The FCC requires that the frequency and deviation of the transmitting device be checked before the device is placed in service and once annually thereafter.

When making measurements using field test equipment, allow for $\pm 10\%$ measurement error. The SYSTEMS SABER radio is factory tuned using equipment of greater accuracy.

Table 3. Transmitter Performance Checks in Air Test Mode

Transmitter Test:

All tests below are done with the test box PTT switch on; however, the switch *must be turned off when changing modes or channels*. All of the following tests can be performed on any frequency/channel. Set power supply to 7.5V at the radio battery terminals.

Set test box **METER SELECTOR** switch to the **MIC** position. Connect ac voltmeter to **AC/DC MONITOR** jack on test box. Connect audio generator output to audio input on test box.

Test Name	Mode	Instructions	Specifications
Tx Power	1	Connect remote antenna port to power meter.	5W or 2W; See Table 1
Tx Current	1	Connect remote antenna port to 50 ohm load.	3.3 or 2.1 Amps See Table 1
Tx Frequency Error	1	Measure Tx frequency.	$\pm 500\text{Hz}$ maximum at remote port
Tx Modulator Limiting	1	Audio input level = 80 mV rms; 1 kHz tone.	5 kHz maximum deviation
Tx Modulator Sensitivity	1	Apply 1 kHz tone. Adjust audio input level for 3.0 kHz deviation.	2-15 mV rms
Tx PL Deviation	2	Connect remote antenna port to deviation meter. Remove audio input.	0.5-1.0 kHz deviation
Tx Modulator Limiting with PL and Voice	2	Audio input level = 80 mV rms; 1 kHz tone.	5 kHz maximum deviation
Tx Connect Tone Deviation	3	Connect remote antenna port to deviation meter. Remove audio input.	0.8-1.2 kHz deviation
Tx Modulator Limiting with DPL and Voice	3	Audio input level = 80 mV rms; 1 kHz tone.	5 kHz maximum deviation
Tx DPL Deviation	4	Connect remote antenna port to deviation meter. Remove audio input.	0.5-1.0 kHz deviation
Tx Modulator Limiting with DPL and Voice	4	Audio input level = 80 mV rms 1 kHz tone.	5 kHz maximum deviation
Tx High Speed Data Deviation	5	Connect remote antenna port to deviation meter.	2.4-3.6 kHz deviation
Tx Binary Path	6	Special path not used.	Not Applicable at this time.

Table 4. Receiver Performance Checks in Air Test Mode**Receiver Test:**

1. In all of the following tests, the remote antenna port is connected to the rf signal generator.
2. The test box meter selector switch is set to **"AUDIO PA"**.
3. The test box speaker selector switch is set to **"A"**.
4. Connect the audio analyzer to the **"AC/DC MTR"** jack on the test box.
5. Set the power supply to 7.5 V at the radio battery terminals.
6. All of the following tests can be done on any frequency/channel.

Test Name	Mode	Instructions	Specifications
Rated Audio	1	Set rf generator output level to 1000 μ V (-47dBm). Set modulation to 1kHz tone @3kHz deviation. Set volume control for rated audio. Set audio analyzer to ac level.	3.7V rms audio out
Rx Audio Distortion	1	Set radio to rated audio. Set audio analyzer to check distortion.	5% maximum
Rx Current at Rated Audio	1	Set radio at rated audio.	235 mA maximum
Rx Sensitivity	1	Set radio to rated audio. Set audio analyzer to check SINAD. Decrease rf output of signal generator until 12dB SINAD is achieved. Note: In some cases it may be necessary to hold monitor button depressed to unsquelch radio.	0.35 μ V maximum (-116 dBm)
Rx Standby Current	2	Set rf signal generator output level to <-140dBm. Check that radio is squelched. Measure current.	105 mA maximum
Rx PL Squelch Sensitivity	2	Set rf signal generator level to <-140dBm. Modulate rf signal with 192.8 Hz tone at 750 Hz deviation. Check that the radio is squelched. Slowly increase rf signal level until radio becomes unsquelched.	0.5 μ V maximum (-113 dBm)
Rx DPL Squelch Sensitivity	4	Set rf signal generator output level to <-140dBm. Modulate rf signal with DPL code 131 at 750 Hz deviation. Check that the radio is squelched. Slowly increase rf signal level until radio becomes unsquelched.	0.5 μ V maximum (-113dBm)

3. ALIGNMENT SETUP AND SPECIFICATIONS

To align the radio using the Radio Service Software, do the following:

- a. Turn the radio off.
- b. Connect the radio to be aligned to the test equipment as shown in Figure 2.
- c. Connect the output of the RIB box (0180353A74) to the serial port of an IBM PC computer or 100% IBM PC compatible computer.
- d. Connect the 0180357A57 RIB box power supply to the RIB box, and plug the RIB box power supply into an ac outlet.
- e. Set the radio power supply to 7.5 volts dc.
- f. Connect the radio remote antenna cable (part of the RTK-4203 programming/test cable) to the rf power input of the communications monitor.
- g. Turn on the radio to be aligned.
- h. Refer to the Radio Service Software (RSS) manual, 68P81060C25, for the alignment procedure.
- i. Refer to Table 5, Alignment Setup and Specifications, while performing the RSS alignment procedure.

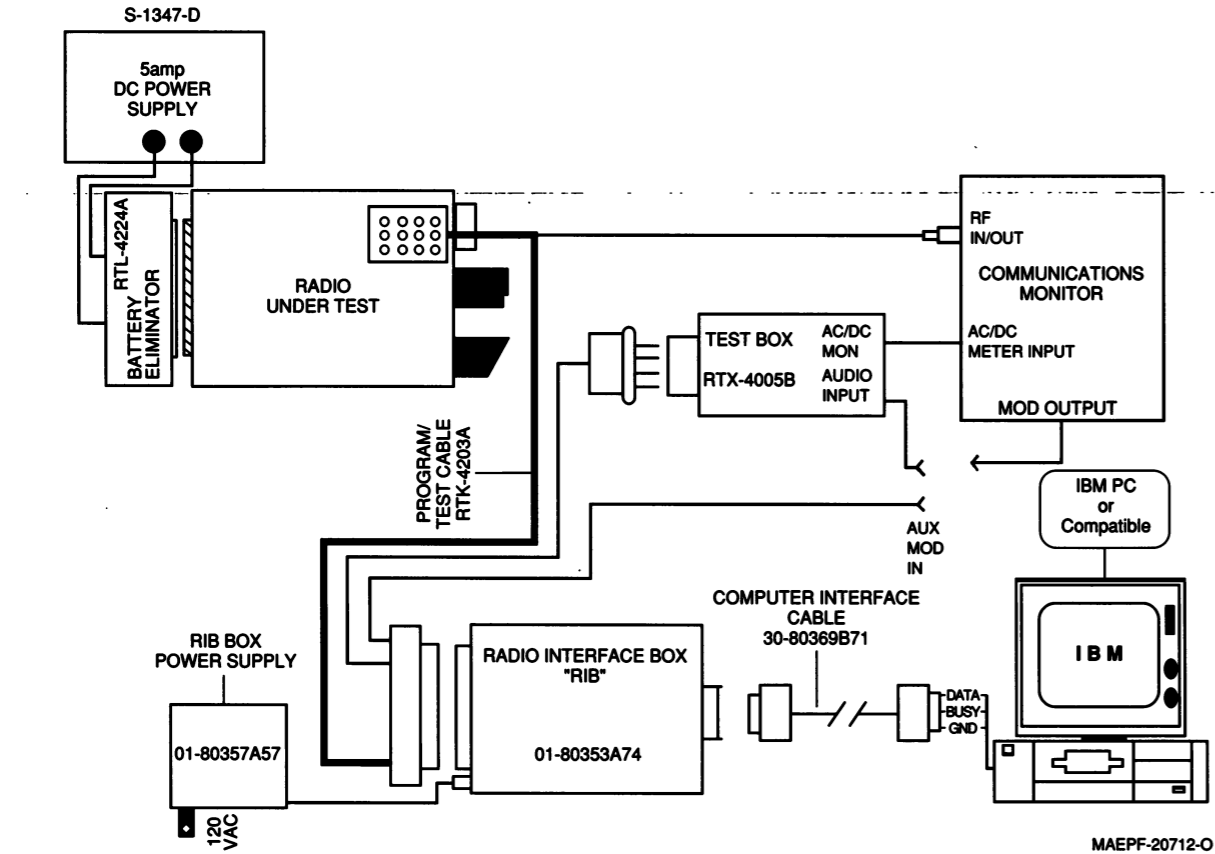


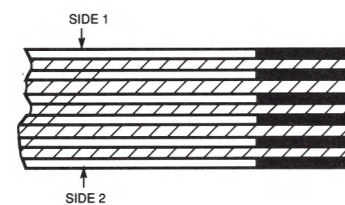
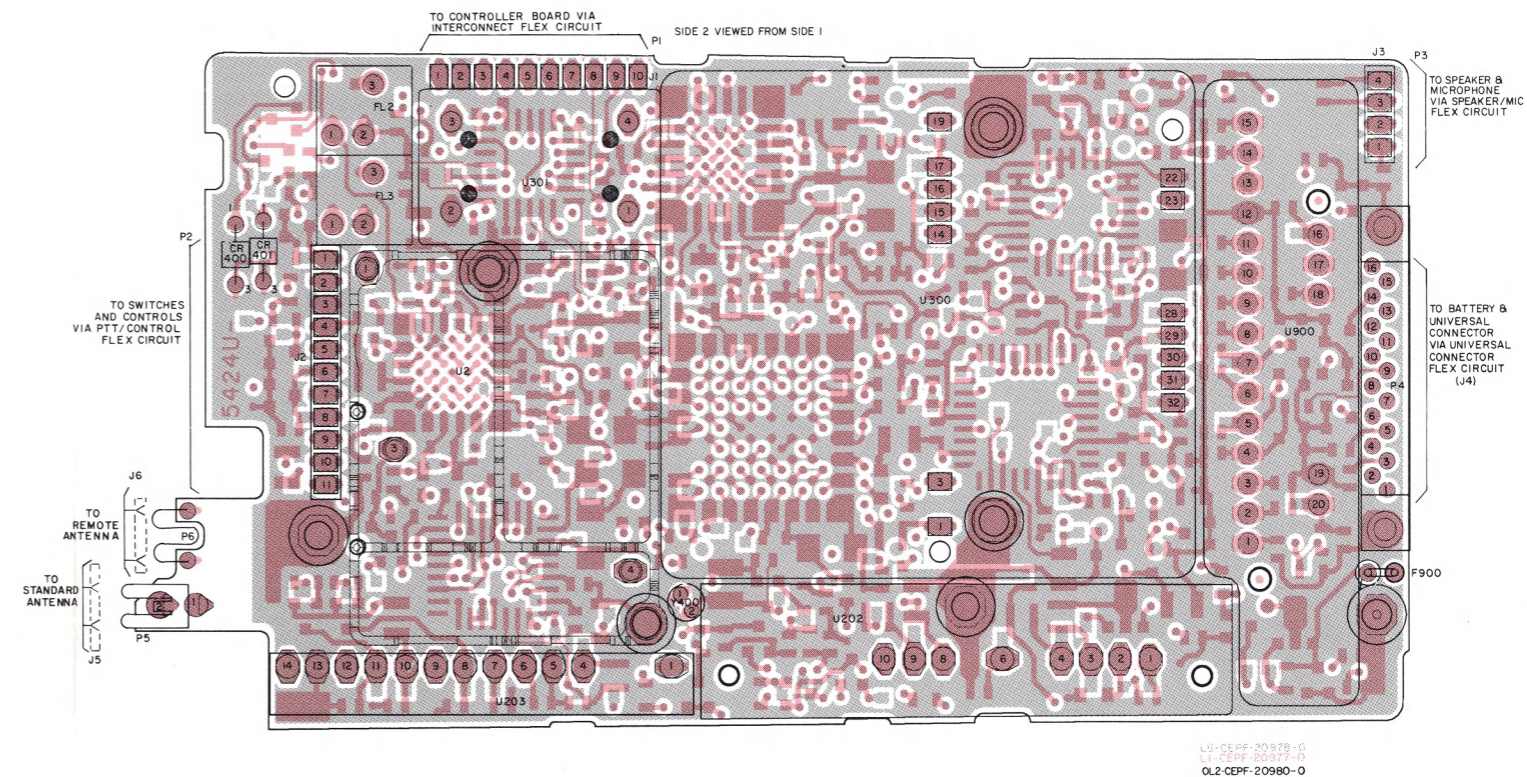
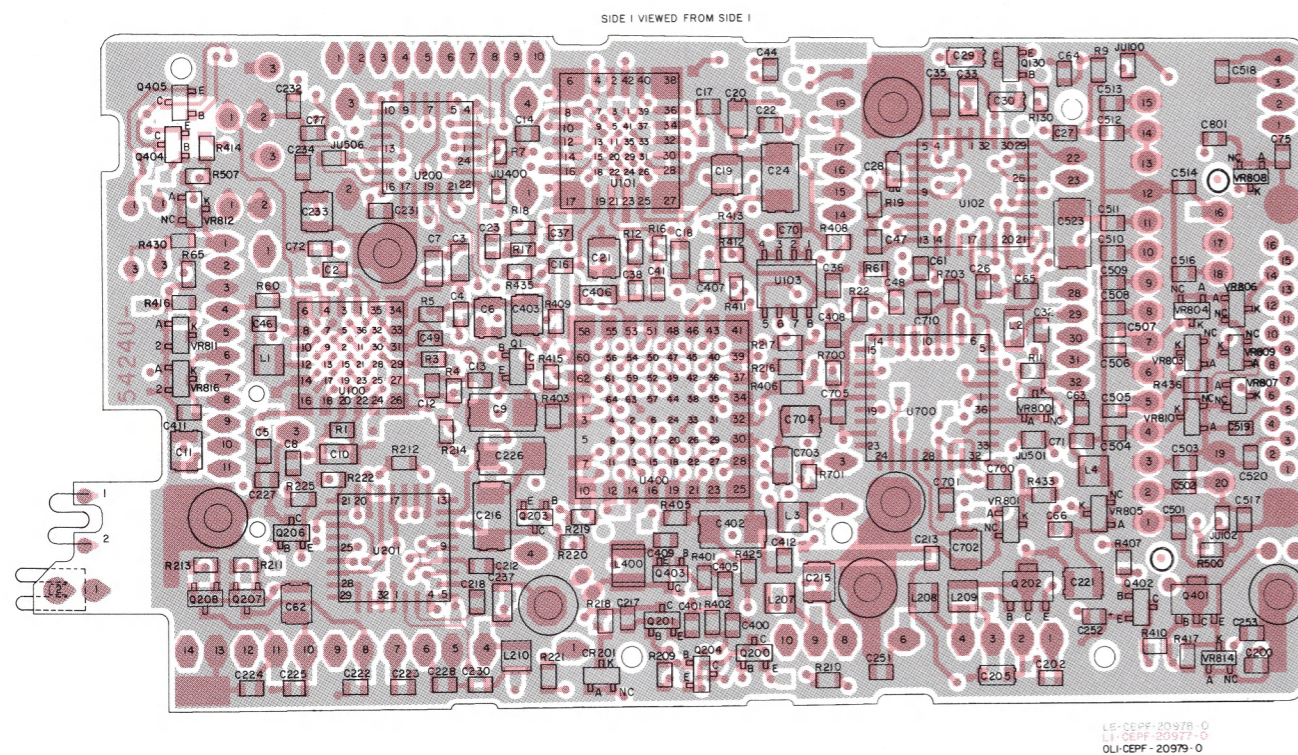
Figure 2. Alignment Setup

Table 5. Alignment Setup and Specifications

Refer to the Radio Service Software manual, 68P81060C25, for detailed alignment procedure.

Note: During alignment, the radio is controlled by the Radio Service Software. *Do not operate the radio's controls during alignment*, since this may result in improper tuning.

Test Name	Test Setup	Tune Target	Test Limits
Tx RF Power Low output level: High output level: Special output level:	Set communications monitor to measure rf power.	2.2 Watts 5.2 Watts Special	2.0 - 2.4 Watts 5.0 - 5.5 Watts 5.5 Watts Maximum
Oscillator Adjust	Set communications monitor to measure rf frequency	Error <120Hz	Error <500 Hz
Deviation Limit	Connect audio generator to AUDIO INPUT on test set. Set frequency to 1000Hz. Set input level to 2 Volts rms.	4.4 kHz Nominal	3.9 - 4.8 kHz
Deviation Balance	Connect audio generator to AUX MODULATION connector on RTK-4203A test cable. Set audio output level for 350 mV. Set audio generator frequency to 1000 Hz or 20 Hz as specified in the alignment procedure.	Within 0.35 dB (4.1%)	Within 1.0 dB (12.2%)
Signalling Deviations DTMF with Connect Tone: DTMF Only: DTMF with PL: ISW Only: DVP Only:	Deviation limits and deviation balance must be aligned before tuning signalling deviations. External modulation inputs are <i>not used</i> during these alignments. <i>Disconnect</i> any external modulation inputs. Set communications monitor to measure deviation.	4.0 kHz Nominal 3.0 kHz Nominal 3.75 kHz Nominal 3.0 kHz Nominal 4.0 kHz Nominal	3.3 - 4.7 kHz 2.5 - 3.5 kHz 3.0 - 4.5 kHz 2.4 - 3.6 kHz 3.5 - 4.5 kHz
Threshold Squelch (Air Test Mode or Conventional Channels)	Set communications monitor rf output frequency to the receive frequency. Set rf output level to < -140 dBm or no output while adjusting squelch setting per RSS manual alignment procedure. Once squelch value has been set, increase communications monitor rf output level until squelch opens. This level is called "threshold squelch."	Per RSS Manual	0.5 µV Maximum



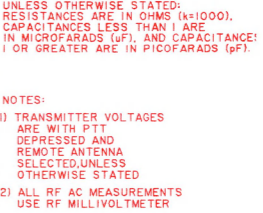
LAYER 1 (L1)
LAYER 2 (L2)
LAYER 3 (L3)
LAYER 4 (L4)
LAYER 5 (L5)
LAYER 6 (L6)

INNER LAYERS

MAEPF-18100-O

SCHEMATIC AND CIRCUIT BOARD NOTES

1. Unless otherwise stated, resistances are in ohms ($k = 1000$), capacitances less than 1 are in microfarads, and capacitances 1 or greater are in picofarads.



SYSTEMS SABER UHF SECURENET
Electrical Parts List

TPLF-3925-O

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
C1	-----	CAPACITOR, Fixed: μF\pm20%; 25V
C2	2113741A25	unless stated
C3	2160521H41	Not Used
C4	2160521G37	1500pF \pm 5%
C5	2113741A17	.22+80-20%
C6	2362998B68	0.1+80-20%
C7	2160521H41	680pF
C8	2160521G37	4.7; 10V
C9	2362998B73	.22+80-20%
C10	2160521H39	0.1+80-20%
C11	2362998B64	10; 16V
C12	2113741A17	.15 \pm 10%; 35V
C13	2113741A45	2.2; 20V
C14	2160521G37	680pF \pm 5%
C15	-----	.01
C16	2113740A46	0.1+80-20%
C17	2160521G37	Not Used
C18	2160521H41	47pF \pm 5%
C19	2362998B16	0.1+80-20%
C20	2362998B59	.22+80-20%
C21	2362998B68	3.3 \pm 10%; 16V
C22	2160521G37	1; 16V
C23	2113741A33	4.7; 10V
C24	2362998B69	0.1+80-20%
C25	-----	3300pF \pm 5%
C26	2113741A37	4.7; 20V
C27	2113741A59	Not Used
C28 thru 30	2362998B59	4700pF \pm 5%
C31	-----	.039 \pm 5%
C32	2113741A59	Not Used
C33	2160521H43	.039 \pm 5%
C34	-----	.33+80-20%
C35	2160521H43	Not Used
C36,37	2160521G37	.33+80-20%
C38	2113740A55	0.1+80-20%
C39,40	-----	100pF \pm 5%
C41	2113740A55	Not Used
C42,43	-----	100pF \pm 5%
C44	2160521G37	Not Used
C45	-----	0.1+80-20%
C46	2113740A55	Not Used
C47	2113741A45	100pF \pm 5%; 50V
C48	2113741A53	.01
C49 thru 60	-----	.022 \pm 5%
C61	2113741A53	Not Used
C62	2362998B68	.022 \pm 5%
C63	2160521G37	4.7; 10V
C64 thru 66	2113740A55	0.1+80-20%
C67 thru 69	-----	100pF \pm 5%; NPO
C70	2113741A51	Not Used
C71	2113740A54	.018
C72 thru 74	-----	91pF \pm 25%; NPO
C75	2113740A55	Not Used
C76	-----	100pF \pm 5%
C77	2113741A45	Not Used
C200	2113740A55	.01
C201	-----	100pF \pm 5%
C202	2113741A51	Not Used
C203,204	-----	.018
C205	2362998B05	Not Used
C206 thru 211	-----	.47 \pm 10%
C212,213	2113741A51	Not Used
C214	-----	.018
C215	2362998B16	Not Used
C216	2362998B73	3.3 \pm 10%; 16V
C217	2113740A55	10; 16V
C218	2160521C21	100pF \pm 5%
C219,220	-----	4700pF \pm 10%
C221	2362998B68	Not Used
C222	2160521A19	4.7; 10V
C223	2113740A55	3300pF \pm 5%
C224	2113741A33	100pF \pm 5%
C225	2113740A55	3300pF \pm 5%
C226	2362998B73	100pF \pm 5%
C227	2113741A51	10; 16V
C228	2113740A55	.018
C229	-----	100pF \pm 5%
C230 thru 232	2113740A55	Not Used
-----	-----	100pF \pm 5%

C233	2362998B16	3.3 \pm 10%; 16V
C234	2113740A55	100pF \pm 5%
C235, 236	-----	Not Used
C237	2160521H41	.22+80-20%
C251 thru 253	2113740A55	100pF \pm 5%
C400,401	2113740A38	24pF \pm 5%; 50V; NPO
C402	2362998B73	10; 16V
C403	2362998B68	4.7; 10V
C404	-----	Not Used
C405	2113741A45	.01
C406	2160521H41	.22+80-20%
C407,408	2160521G37	0.1+80-20%
C409	2113740A13	2.7pF
C410	-----	Not Used
C411,412	2160521G37	0.1+80-20%
C500	-----	Not Used
C501 thru 514	2113740A55	100pF \pm 5%
C515	-----	Not Used
C516 thru 520	2113740A55	100pF \pm 5%
C700,701	2160521G37	0.1+80-20%
C702	2362998B16	3.3 \pm 10%; 16V
C703	2362998B05	.47 \pm 10%
C704	2362998B68	4.7; 10V
C705	2160521G37	0.1+80-20%
C706 thru 709	-----	Not Used
C710	2113740A55	100pF \pm 5%
C800	-----	Not Used
C801	2113740A55	100pF \pm 5%
CR200	-----	DIODE: See Note 1
CR201	4805129M05	Not Used
CR400	4805729G34	SOT
CR401	4805729G35	LED, Red
-----	-----	LED, Yellow
F900	0105955P27	FUSE:
-----	-----	ASSEMBLY, 5 Amp
FL1	-----	FILTER:
FL2	9105685Q05	Not Used
FL3	9105685Q06	Ceramic; 450kHz; 20kHz BW
-----	-----	Ceramic; 450kHz; 15kHz BW
J1	0905287C05	JACK:
-----	-----	Socket, Printed Circuit
J2	0905287C05	(LCD Interconnect)(10 req'd)
-----	-----	Socket, Printed Circuit
J3	0905287C05	(PTT Controls Flex)(11 req'd)
-----	-----	Socket, Printed Circuit
-----	-----	(Speaker/Mic Connector)(4 req'd)
JU500 thru 503	-----	JUMPER:
JU504,505	0605021K01	Not Used
-----	-----	0 Ω
L1	2405452C64	COIL, RF: unless stated
L2	2462575A05	1500nH \pm 5%
L3	2405452C49	Choke; 4.7uH
L4	2405452C09	360nH \pm 5%
L200 thru 206	-----	50nH \pm 5%
L207 thru 210	2405452C49	Not Used
L400	2460578C43	360nH \pm 5%
-----	-----	33uH
P1	-----	PLUG:
P2	2805520Q01	Not Used
P3,4	-----	Connector
P5	3905446Q03	Not Used
P6	3905445Q03	Contact, Antenna
-----	-----	Contact, RF Wireform
Q1	4805128M16	TRANSISTOR: See Note 1
Q2	-----	PNP; SOT-23
Q200,201	4805128M44	Not Used
Q202	4805128M27	NPN; SOT-23
Q203	4805128M16	PNP; SOT-89
Q204	4805218N13	PNP; SOT-23
Q205	-----	PNP; SOT
Q206	4805128M16	Not Used
Q207,208	4805128M29	PNP; SOT-23
Q400	-----	PNP; SOT
Q401	4805128M27	Not Used
Q402 thru 405	4805128M44	PNP; SOT-89
-----	-----	NPN; SOT-23

R1	0660079V23	RESISTOR, Fixed: $\Omega$$\pm$5%; 1/8W
R2	-----	unless stated
R3	0660076E76	82k
R4	0660078T24	Not Used
R5	0660078T01	13k \pm 1%
R6	-----	91k
R7	0660078J80	Not Used
R8	-----	10k
R9	0660078G33	Not Used
R10	-----	49.9k \pm 1%
R11	0660078G33	Not Used
R12	0660076A49	Not Used
R13 thru 15	-----	2k \pm 1%
R16	0660079V28	1k
R17	0660076E73	Not Used
R18	0660076E89	130k
R19	0660076A49	10k \pm 1%
R20,21	-----	47k \pm 1%
R22	0660076A92	1k
R23 thru 59	-----	Not Used
R60	0660076A29	Not Used
R61	0660076A77	150
R62	0660076B01	15k
R63, 64	-----	100
R65	0660076A25	Not Used
R200 thru 208	-----	100k
R209	0660076A49	Not Used
R210	0660078J80	1k
R211	0660076A75	49.9k \pm 1%
R212	0660078G33	12k
R213	0660076A75	2k \pm 1%
R214	0660076B01	12k
R215	-----	100k
R216,217	0660076A73	Not Used
R218	0660076E73	10k
R219	0660076E85	10k \pm 1%
R220	0660076B01	20k \pm 1%
R221	0660076E89	100k
R222	0660076A73	47k \pm 1%
R223,224	-----	10k
R225	0660076A73	Not Used
R400	-----	10k
R401	0660076A65	Not Used
R402	0660076B25	4.7k
R403	0660076B01	1M \pm 5%
R404	-----	100k
R405	0660076A73	Not Used
R406	0660076A73	10k
R407	0660076A65	10k
R408	0660076B01	4.7k
R409	0660076A29	100k
R410	0660076A41	100k
R411	0660079J33	150
R412,413	0660078L01	470
R414	0660078T01	20k \pm 1%
R415	0660076B01	100k \pm 1%
R416	0660078L01	10k
R417	0660076B01	100k
R418 thru 424	-----	100k \pm 1%
R425	0660076A73	Not Used
R426 thru 429	-----	10k
R430	0660076A29	Not Used
R431,432	-----	150
R433	0660076A21	Not Used
R434	-----	68
R435	0660076A49	Not Used
R436	0660076A41	1k
R500	0660076A73	470
R501 thru 506	-----	10k
R507	0660076B01	Not Used
R700	0660078J80	100k
R701	0660076A49	100k
R702	-----	49.9k \pm 1%
R703	0660076E89	1k
R800	RPX4690A	Not Used
-----	-----	47k \pm 1%
R801	0660076B08	Potentiometer, Kit, On/Off/Volume
R802	0660076A93	(includes S800)
R803	-----	200k
R804	0660076A85	68k
R805	0660076A49	Not Used
-----	-----	33k
-----	-----	1k

S800	RPX4690A	SWITCH:
S801/S804	4005221R01	Kit, On/Off/Volume (includes R800)
-----	-----	Dual-Function, Clear/Code
-----	-----	(S804)(Standard) and
-----	-----	Emergency (S801)(Optional)
S802	-----	Not Used
S803	RPX4694A	Kit, Contact Snapdome, PTT
S805	RPX4694A	Kit, Contact Snapdome, Monitor
S806 thru 822	-----	Not Used
S823	RPX4689A	Kit, Frequency
-----	-----	CIRCUIT MODULE: See Note 1
U1	-----	Not Used
U2	NLE9432A	Filter/Amp/Mixer
U100	0105958P77	IC, I-F
U101	0105958P80	IC, Audio Filter, CMOS
U102	0105958P74	IC, Audio, Bipolar
U103	5105469E65	IC, Regulator
U200	0105953N05	IC, Digital/Analog Converter, CMOS
U201	0105959P66	Transmit Automatic Level Control
U202	NLE9472A	5W-Power Amplifier
U203	NFE6061A	Filter/Detector/Switch
U300	NLE9462A	Synthesizer (440-470 MHz)
U301	NXN6269A	Oscillator, Reference; 16.8MHz
U400	0105956S06	Microcomputer, MC68HC11; Binary
U700	0105954S43	Signal Filter, Phase II, CMOS
U900	NTN4720A	SECURENET Bypass Module
or	-----	Optional Encryption Module
VR800	4805129M35	DIODE: See Note 1
VR801	4805129M49	Zener, 5.6V
VR802	-----	Zener, 16V
VR803 thru 807	4805129M35	Not Used
VR808	4805129M49	Zener, 5.6V
VR809 thru 812	4805129M35	Zener, 16V
VR813	-----	Zener, 5.6V
VR814	4805129M49	Not Used
VR815	-----	Zener, 16V
VR816	4805129M35	Not Used
-----	-----	Zener, 5.6V
Y400	4805664G32	CRYSTAL:
-----	-----	7.3728MHz
NONREFERENCED ITEMS		
-----	0905287C07	SOCKET, Printed Circuit
-----	1405881R01	(for all modules)(71 req'd)
-----	7505934Q01	BOOT, Crystal (For Y400)
-----	8405334T01	PAD, Oscillator (For U301)
-----	-----	PC BOARD, Main

NOTE:
1. For optimum performance, order replacement diodes, transistors, and circuit modules by Motorola part number only.

SYSTEMS SABER Controller Board
Electrical Parts List

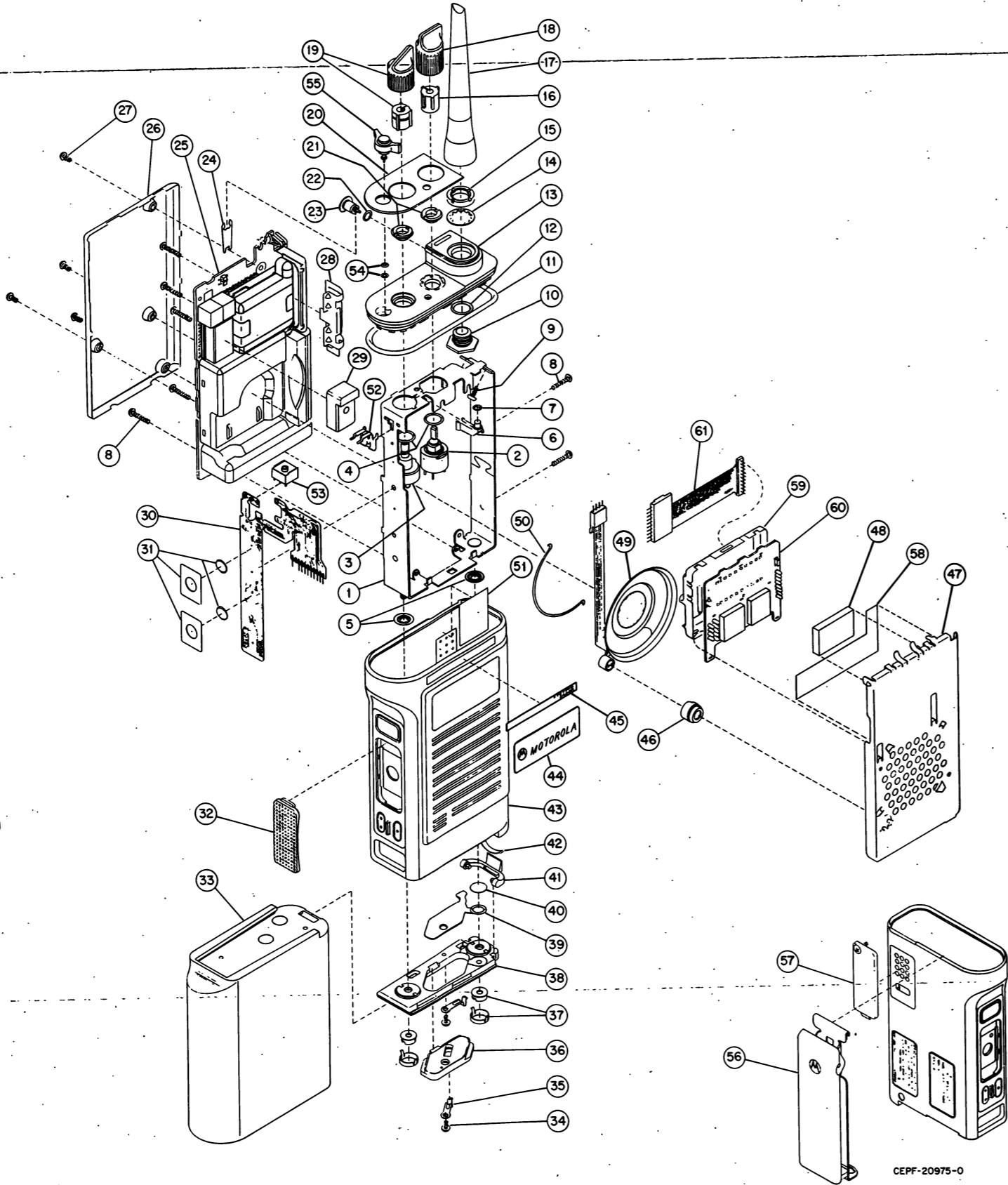
TPLF-3926-O

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
C500,501	-----	CAPACITOR, Fixed:
C502 thru 505	2113740F51	pF \pm 30%; 50V
C506	2113740A55	unless stated
C507 thru 510	2113740F51	Not Used
C511	2311049A37	100
C512	2113741B69	100
C513,514	2113740A38	100
C515	2113740A13	1 μ F \pm 20%
C516	2113741A45	.1 μ F
C517 thru 519	2113741B69	24
-----	-----	2.7 \pm .25pF
-----	-----	.01 μ F
-----	-----	.1 μ F
CR501,502	4805729G37	DIODE: See Note 1
CR503	4805129M06	LED; Green SMD (See Note 2)
-----	-----	Dual; SOT-23 (See Note 2)
J7	0905287C10	JACK:
J8	0905287C10	Socket, Keypad; (qty 9)
-----	-----	Socket, LCD; (qty 10)
L501,502	2462575A23	COIL, RF: Unless stated
L503	2460578C43	.1 μ H
-----	-----	33 μ H
Q501	4805128M12	TRANSISTOR: See Note 1
Q502	4805218N50	NPN; BCW60B (RH) (See Note 2)
Q503	4805128M12	NPN; SOT-23
-----	-----	NPN; BCW60B (RH) (See Note 2)
R501	0660076A09	RESISTOR, Fixed: $\Omega$$\pm$5%; 1/8W
R502	0660076A69	unless stated
R503	0660079V13	22 (See Note 2)
R504,505	-----	6.8k (See Note 2)
R506	0660079V13	33k
R507,508	0660076N49	Not Used
R509	0660079V13	33k
R510	0660076N39	1K
R511	0660076N49	33k
R512	0660076A39	390
R513	0660076N85	33k
R514	0660076N39	390
R515	0660079U89	4.7k
R516	0660076B12	4.7k
R517	0660079U89	300k
R518	0660076A73	4.7k
R519	0660079V13	10k
R520	0660079V25	3

SYSTEMS SABER I SECURENET UHF
Exploded View Parts List

TPLF-3923-O

ITEM NO.	MOTOROLA PART NO.	DESCRIPTION
1	RPX4720A	ASSEMBLY, Frame Stud (includes item 5)
2	4005640Q08	SWITCH, Frequency (S823)
3	1805799P02	SWITCH, On/Off (S800) /Volume Control (R800)
4	3205082E62	GASKET, O-Ring (2 req'd)
5	3205422Q01	SEAL, Stud (2 req'd) (part of item 1)
6	6105436Q01	LIGHTPIPE, LED
7	3205082E59	GASKET, O-Ring
8	0305714J10	SCREW, Module, Ph Pan Hd; 2-56x.4" (7 req'd)
9	0300140332	SCREW, Top Panel; 3-28x.187" (2 req'd)
10	RPX4693A	KIT, Antenna Bushing (includes item 12)
11	3205082E80	GASKET, O-Ring (part of item 13)
12	3205082E58	GASKET, O-Ring (part of item 10)
13	RPX4692A	KIT, Control Top Panel (includes item 11)
14	0400139731	LOCKWASHER, Internal Tooth
15	0205591R01	NUT, Antenna Bushing
16	4305141R03	INSERT, Frequency Knob
17	NAE6432A	ANTENNA, UHF Helical (438 - 470 MHz)
18	NAE6440A	ANTENNA, UHF Whip (403 - 512 MHz)
19	3605526Q01	Frequency Knob
20	RPX4698A	KIT, On/Off Volume Knob
21	1305622Q32	ESCUTCHEON, SYSTEMS SABER
22	1305622Q36	ESCUTCHEON, Submersible
23	0205916P01	NUT, Spanner (2 req'd)
24	3205082E61	GASKET, O-Ring (part of item 23)
25	RPX4691A	KIT, RF Connector (includes items 22,24)
26	4205852N01	CONTACT, Ground, RF (part of item 23)
27	NLE9911A	ASSEMBLY, UHF Main PC Board
28	NLE9911A	ASSEMBLY, Back Shield (includes item 27)
29	0305706Q01	SCREW, Captive; 2-56 (4 req'd) (part of item 26)
30	4205577Q01	CLIP, Ground
31	1405156U01	BOOT, Oscillator
32	8405895T01	PTT/Controls Flex
33	0105956Q93	KIT, PTT/Controls Flex Assembly (includes items 2,3,31)
34	RPX4694A	KIT, Contact Snapdome (S803, 805) (2 req'd) (part of item 30)
35	4505022P02	LEVER, PTT (part of item 43)
36	NTN4595B	BATTERY, 1500 mAh
37	0305706Q02	SCREW, Baseplate, Ph Pan Hd; 2-56x3/32" (2 req'd) (part of item 43)
38	3905453Q01	CONTACT, Power (2 req'd) (part of item 43)
39	4205669T01	RETAINER, Baseplate (part of item 43)
40	RPX4696A	KIT, Slotted Spanner Nut (2 req'd) (part of item 43)
41	6405847N03	BASEPLATE (part of item 43)
42	3205783T01	SEAL, Elastomer (part of item 43)
43	3205472M02	SEAL, Vacuum Port (part of item 43)
44	5505333Q01	LATCH, Battery (part of item 43)
45	4105775Q01	SPRING, Latch (part of item 43)
46	NHN6410A	ASSEMBLY, Housing, SABER I (includes items 32, 34 thru 42)
47	NHN6408A	ASSEMBLY, Housing, SABER I Submersible (includes items 32, 34 thru 42)
48	3305183R03	LABEL, Bottom Nameplate
49	3305183R14	LABEL, Top Nameplate
50	3305183R37	LABEL, Top Nameplate, Submersible
51	1405490Q01	BOOT, Microphone
52	0705830N05	BRACKET, Speaker
53	7505316J07	PAD, Shock
54	0105958M34	ASSEMBLY, Speaker/Microphone Flex
55	4205872S01	RETAINER, Speaker
56	1405182M03	INSULATOR, Universal Connector
57	0705319R01	BRACKET, Switch
58	4005221R02	SWITCH, Dual-Function (S801, 804)
59	3205082E68	GASKET, O-Ring, Emergency (2 req'd)
60	NTN5068A	KIT, Push-and-Rotate Knob (includes item 54)
61	NTN4788A	ASSEMBLY, Belt Clip
62	NTN5025A	Cover, Universal Connector
63	1405888Q03	INSULATOR, Front Shield
64	2605682U01	SHIELD, LCD Board
65	NTN5963A	ASSEMBLY, Controller PC Board, FLEX CIRCUIT, LCD Interconnect
66	8405681U01	

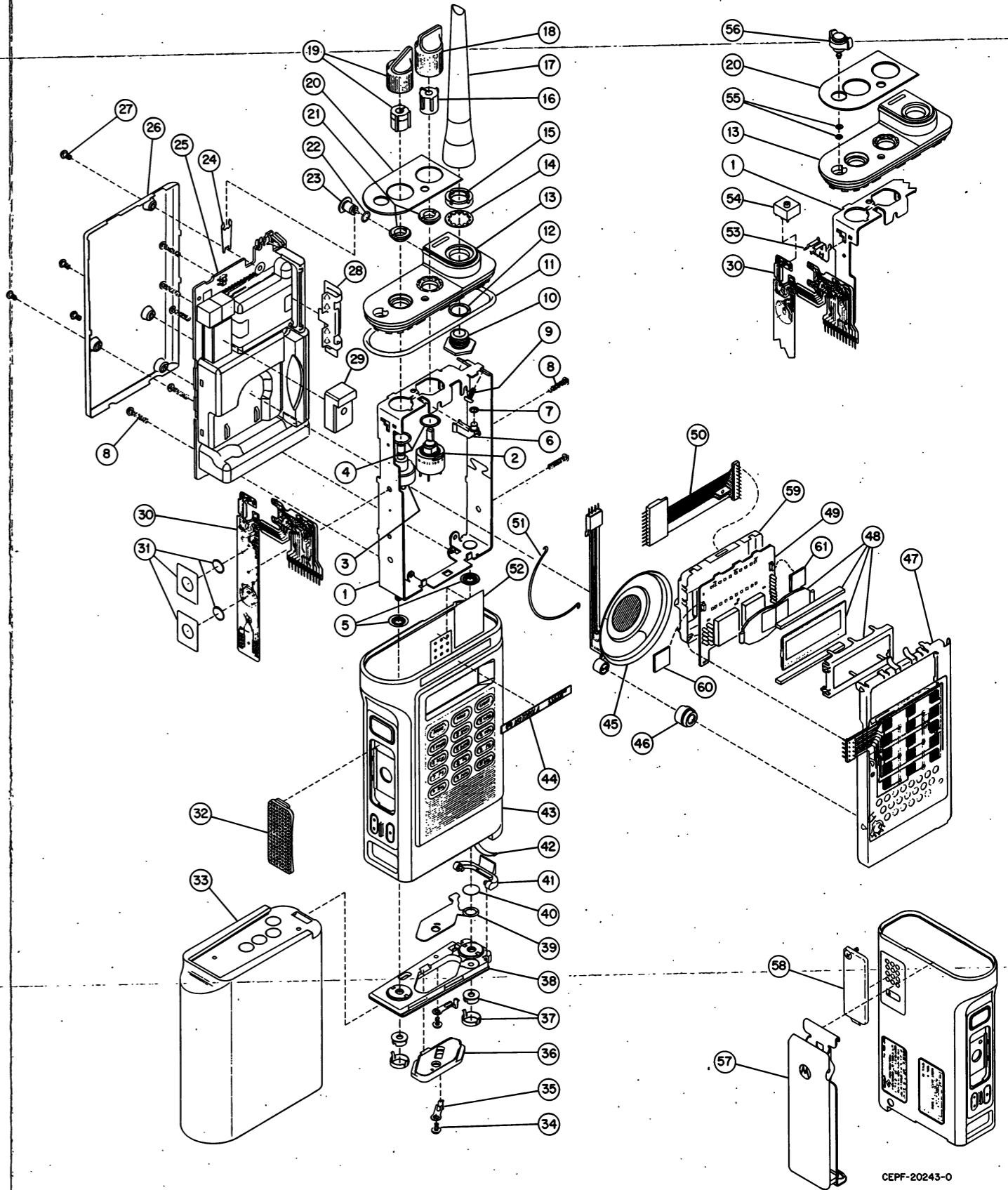


CEPF-20975-O

SYSTEMS SABER III SECURENET UHF
Exploded View Parts List

TPLF-3924-O

ITEM NO.	MOTOROLA PART NO.	DESCRIPTION
1	RPX4720A	ASSEMBLY, Frame Stud (includes item 5)
2	4005640Q08	SWITCH, Frequency (S823)
3	1805799P02	SWITCH, On/Off (S800) /Volume Control (R800)
4	3205082E62	GASKET, O-Ring (2 req'd)
5	3205422Q01	SEAL, Stud (2 req'd) (part of item 1)
6	6105436Q01	LIGHTPIPE, LED
7	3205082E59	GASKET, O-Ring
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9	0300140332	SCREW, Top Panel; 3-38 x .187" (2 req'd)
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20	RPX4698A	KIT, On/Off Volume Knob
21	1305622Q32	ESCUTCHEON, SYSTEMS SABER
22	0205916P01	NUT, Spanner (2 req'd)
23	3205082E61	GASKET, O-Ring (part of item 23)
24	RPX4691A	KIT, RF Connector (includes items 22,24)
25	4205852N01	CONTACT, Ground, RF (part of item 23)
26	NLE9911A	ASSEMBLY, UHF Main PC Board
27	NTN4726A	ASSEMBLY, Back Shield (includes item 27)
28	0305706Q01	SCREW, Captive (4 req'd) (part of item 26)
29	4205577Q01	CLIP, Ground
30	1405156U01	BOOT, Oscillator
31	8405895T01	PTT/Controls Flex
32	0105956Q93	KIT, PTT/Controls Flex Assembly (includes items 2,3,31)
33	RPX4694A	KIT, Contact Snapdome (S803, 805) (2 req'd) (part of item 30)
34	4505022P02	LEVER, PTT (part of item 43)
35	NTN4595B	BATTERY, 1500 mAh
36	0305706Q02	SCREW, Baseplate, Ph Pan Hd; 2-56x3/32" (2 req'd) (part of item 43)
37	3905453Q01	CONTACT, Power (2 req'd) (part of item 43)
38	4205669T01	RETAINER, Baseplate (part of item 43)
39	RPX4696A	KIT, Slotted Spanner Nut (2 req'd) (part of item 43)
40	6405847N03	BASEPLATE (part of item 43)
41	3205783T01	SEAL, Elastomer (part of item 43)
42	3205472M02	SEAL, Vacuum Port (part of item 43)
43	5505333Q01	LATCH, Battery (part of item 43)
44	4105775Q01	SPRING, Latch (part of item 43)
45	NHN6446A	ASSEMBLY, Housing, SYSTEMS SABER (includes items 32, 34 thru 42)
46	3305183R15	LABEL, Nameplate, SYSTEMS SABER
47	0105958M34	ASSEMBLY, Speaker/Microphone Flex
48	1405490Q01	BOOT, Microphone
49	REX4074A	ASSEMBLY, LCD/Speaker Bracket
50	REX4073A	KIT, LCD Assembly (part of item 49)
51	8460999B03	ASSEMBLY, Controller PC Board, (includes item 48)
52	8405328T01	FLEX CIRCUIT, LCD Interconnect
53	4205872S01	RETAINER, Speaker
54	1405182M03	INSULATOR, Universal Connector
55	0705319R02	BRACKET, Switch
56	4005221R02	SWITCH, Dual-Function (S801, 804)
57	3205082E68	GASKET, O-Ring, Emergency (2 req'd)
58	NTN5068A	KIT, Push-and-Rotate Knob (includes item 54)
59	NTN4788A	ASSEMBLY, Belt Clip
60	NTN5025A	Cover, Universal Connector
61	2605897T01	SHIELD, LCD Board
62	7505316J06	PAD
63	7505316J05	PAD



CEPF-20243-O

SERVICE MANUAL QUESTIONNAIRE

We believe that reports from users provide valuable information for producing quality manuals. By taking a few moments to answer the following questions as they relate to this specific manual, you can take an active role in the continuing effort to ensure that our manuals contain the most accurate and complete information of benefit to you. Thank you for your cooperation.

In reference to Manual Number: **68P81066C95-0**

SYSTEMS SABER™ SECURENT™ Handie-Talkie® Portable Radios

1. Please check all the appropriate boxes:

	Complete	Incomplete	Correct	Incorrect	Clear	Confusing	Size Adequate	Size Too Small	Not Covered in This Manual
Disassembly Procedures									
Alignment Procedures									
Exploded Views									
Schematic Diagrams									
Circuit Board Details									
Electrical Parts Lists									
Exploded View Parts List									

2. How would you rate the overall organization of this manual?

☐ excellent ☐ very good ☐ good ☐ fair ☐ poor

3. Did this Service manual provide you with the information necessary to service and maintain the specific equipment?

☐ very much so ☐ generally yes ☐ to some extent ☐ no

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5. We would appreciate any corrections or recommendations for improving this manual. Please include the specific page number(s) of the diagram or procedure in question.

a. Disassembly Procedures: (Page No. _____)

b. Alignment Procedures: (Page No. _____)

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Please specify the page number along with any corrections or recommendations for improvement.

- d. Schematic Diagrams: (Page No. _____)
- e. Component Location Details: (Page No. _____)
- f. Electrical Parts List: (Page No. _____)
- g. Exploded View Parts List: (Page No. _____)

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When ordering replacement parts or equipment information, the complete identification number should be included. This applies to all components, kits, and chassis. If the component part number is not known, the order should include the number of the chassis or kit of which it is a part, and sufficient description of the desired component to identify it.

Crystal and channel element orders should specify the crystal or channel element type number,

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Communications Parts Division
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1313 E. Algonquin Road
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Federal Government Orders:

Motorola Inc.
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Attention: Order Processing
1701 McCormick Drive
Landover, MD 20785

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Call: 1-800-422-4210
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Crystal Service Items:

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403305 MOTOPARTS SHBU. UD (International)
FAX: 708-576-6285

Federal Government Orders:

FAX: 301-925-2473 or 301-925-2474

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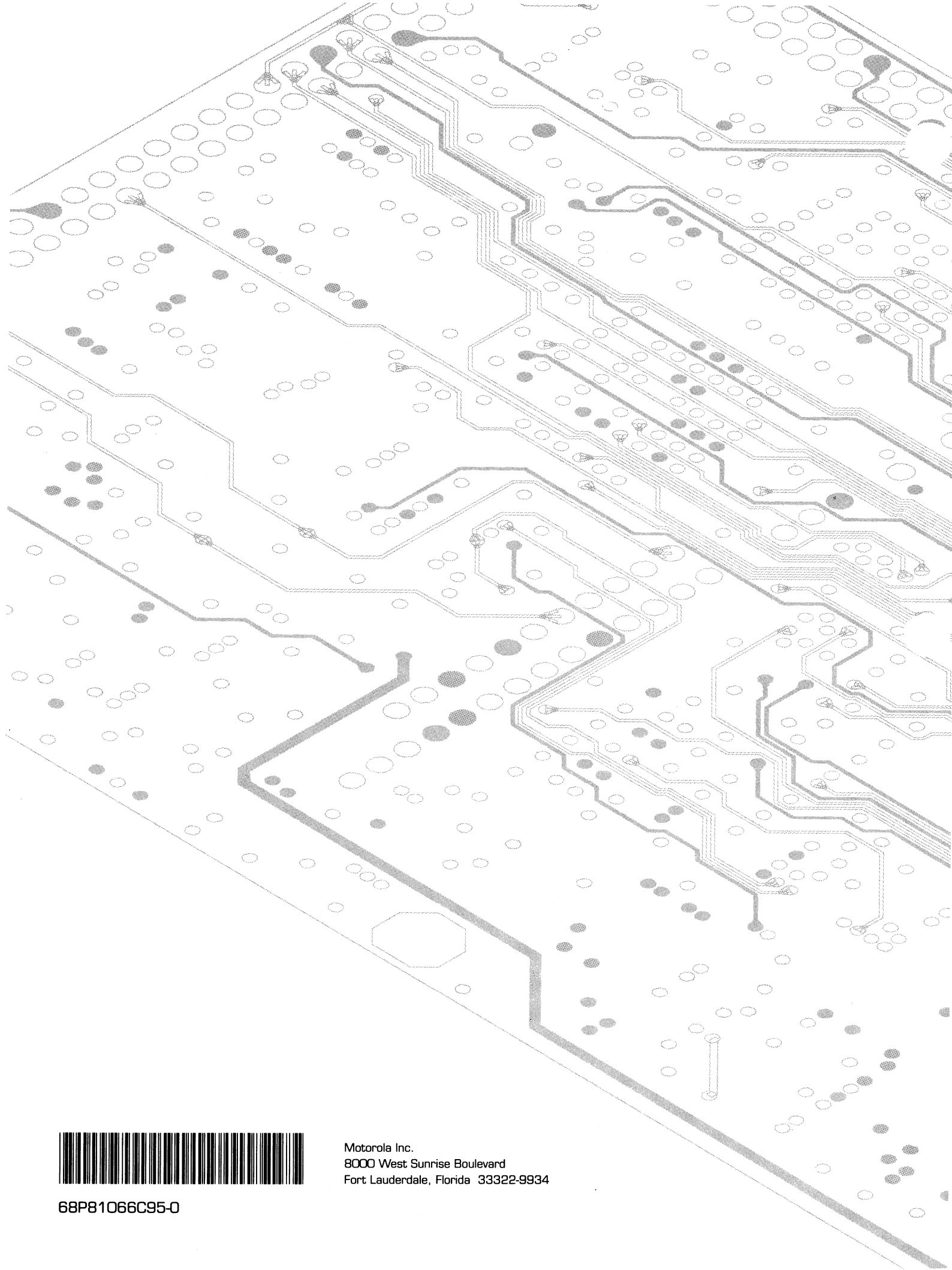
Crystals:
Call: 1-800-323-0234 (except Illinois Residents)
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